THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XX. No. 477—23RD YEAR.] LONDON, JANUARY 17, 1871. [Subscription per Annum. { 15s. in Advance. / 18s. Credit.] Price 8d. Unstamped.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.

RAMSAY'S PATENT CONDENSED COKE.

DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.

GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES. CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.

Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.

Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

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Patentees of the Standard Gasometers for the Government, and of the

IMPROVED DRY GAS-METERS.

These Meters are warranted to measure correctly and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured.

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OR
15, MARKET STREET, MANCHESTER.

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JOSEPH COWEN and CO.,

BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,

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J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

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ALMA WORKS,
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and 69, UPPER THAMES STREET, LONDON,

Original Manufacturers of Wrought-Iron Gas-Tubes, and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam-Boilers.

J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest orders may be executed in a few days.

Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanized Tubes, &c.

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WILLIAM COCHRAN CARR begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.

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J. & W. ROMANS, of Edinburgh and London, in returning thanks for the confidence hitherto reposed in them, beg to intimate that they have exended their Colliery connexion for the supply of SCOTTISH CANNELS, and have taken a lease of the CROWN WHARF, LIMEHOUSE CUT, LONDON, where these rich Coals can be obtained at the lowest prices.

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Contracts made to supply any quantity, and analysis sent, on application to the Offices, 53, Frederick Street, EDINBURGH, or 1, Walbrook, Mansion House, LONDON.

Shippers of steam and house Coal, entered on the Government list. Freightage secured on best terms.

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LA COUR & WATSON,
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NEW YORK, 1853;
PARIS, 1855.

(INVENTED & PATENTED IN 1844,)

COMBINING ALL THE LATEST IMPROVEMENTS,

MANUFACTURED ONLY BY

PRIZE MEDALS.
LONDON, 1862;
DUBLIN, 1865;
PARIS, 1867.

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MEDAL AWARDED, EXHIBITION, 1862, "FOR GOOD WORK."

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GALVANIZED & GLASS ENAMELLED TUBES & FITTINGS,

LAP-WELDED IRON & BRASS BOILER-TUBES, ETC., ETC.

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HENRY HOWARD & CO.,

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OLD HILL, near DUDLEY,

MANUFACTURERS OF

HOWARD'S PATENT IMPROVED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

Also ORDINARY WELDED WROUGHT-IRON TUBES and FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

CORE BARS FOR IRONFOUNDERS, STOCKS, TAPS, AND DIES, IRON COCKS, &c.

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SILVER MEDAL, PARIS EXHIBITION, 1867.

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ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

For Gas, Steam, Water, &c.

SOLE LICENSEES for the United Kingdom for the LAVENANT PATENT ENAMELLED TUBES & FITTINGS,

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For Locomotive, Marine, and Stationary Boilers.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools of all kinds.

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ECONOMY IN GAS PURIFICATION. A PURER GAS AT LESS COST, AND GREAT SAVING IN LABOUR.

M'DOUGALLS' PRECIPITATED PEROXIDE OF IRON.

The above Oxide is now in use at some of the largest works in the kingdom, and has gained a decided preference, owing to its efficiency, cheapness, and the great saving in labour effected by its use.

It is a pure artificial Hydrated Peroxide, with an addition of only sufficient sawdust to give it the needful lightness or porosity to prevent pressure, and every particle is available for use.

In selecting an oxide, a point more important than its price, is to learn the cost of labour entailed in its use. Whilst at large works the cost of labour for purifying, where lime alone or the natural oxides are employed, is 2d. to 3d. per ton of coals, by the use of the above Oxide it is reduced to 1d. to 1½d., owing to the purifier's working so much longer when charged, and to rapid revivification—two points of special importance in the busy season.

For export to Foreign Works it is unequalled, every particle being available, and saves freight over less concentrated materials.

NOTE.—It is important to note that only the Hydrated Peroxide of Iron is useful, simple oxide being worthless. Inferior oxides show a large per centage of simple oxide, but very little Hydrated Peroxide.

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DELPH & TINTAM ABBEY FIRE-CLAY & BRICK WORKS,

STOURBRIDGE,

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MANUFACTURERS OF

GLASS-HOUSE POTS, CRUCIBLES, GAS-RETORTS, & FIRE-BRICKS OF EVERY DESCRIPTION.

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THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

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PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

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THOMAS PIGGOTT & CO.,

(Established 1822,)

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MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

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AND GAS APPARATUS OF EVERY DESCRIPTION.

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Peebles' Patent Wet and Dry Gas-Meters in Tin-Plate Cases, with Tongue and Groove Joints.

IMPROVED WET METERS IN CAST-IRON CASES.

STATION-METERS, GOVERNORS, EXPERIMENTING METERS, PHOTOMETERS, PRESSURE-GAUGES, &c.

WILLIAM INGHAM AND SONS,

WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

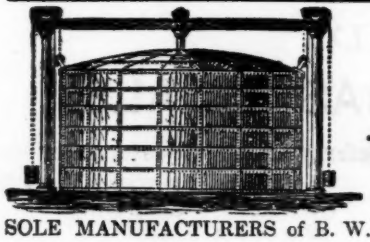
The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

A large Stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all Sizes kept in London at Mr. ALFRED WILLIAMS, Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.

N.B.—*Export orders continue to have prompt attention.*



IMPROVED GAS APPARATUS,

FOR CITIES, TOWNS, VILLAGES, &c.,

INVENTED AND MANUFACTURED BY

W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD.

SOLE MANUFACTURERS of B. W. THURSTON'S IMPROVED SCRUBBER, CONDENSER, and WASHER, in use many of the principal Gas-Works on the Continent.

PATENTEES of the IMPROVED COMBINED PURIFYING APPARATUS, so eminently adapted for Exportation.

ESTIMATES, PLANS, and SPECIFICATIONS PREPARED for BUILDINGS and APPARATUS.

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*** *Please address letters to Huddersfield.*

REFERENCES TO NEARLY 300 GAS-WORKS.

JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS,

And all kinds of Experimental Gas Apparatus.

FULLERTON, SON, & CO.,

LONDON ROAD METER-WORKS, EDINBURGH,

SOLE MANUFACTURERS OF

THE PATENT IMPROVED TIN-PLATE DRY GAS-METER,

WITH SPECIAL FACILITIES FOR ADJUSTMENT AND REPAIR,

The principal parts of the mechanism being accessible by the removal of a single Screw.

GAS-METERS on the WET and DRY principles made in CAST-IRON and TIN-PLATE CASES.

STATION-METERS, GOVERNORS, EXPERIMENTAL & TEST METERS, GAS APPARATUS, &c.

LONDON AGENTS: THORNELOE & CO., 34, LONDON WALL, CITY, E.C.,

GAS & WATER ENGINEERS, & CONTRACTORS

FOR GAS & WATER WORKS APPARATUS.

SHOW-ROOMS AND WHOLESALE WAREHOUSE FOR

Wrought-Iron Tubes and Fittings for Gas, Water, and Steam; Chandeliers, Pendants, Lamps and Brackets; Plumbers Work, Water-Closets, Pumps, &c.; Lead, Composition, Brass, and Copper Tubes.

METERS SUPPLIED TO ORDER FROM STOCK.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

Analyses by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

Description.	Cubic Feet of Gas per Ton of Coals.	Illuminating Power in Candles.	Coke per Ton of Coal used. Cwt.	Ash in Coke per Cent.	Sulphur in Coal per Cent.
Best Silkstone . .	10,900	17·0	12·8	2·6	1·7
Norfolk Silkstone . .	11,000	15·94	12·5	4·4	1·64
Silkstone Brights . .	11,500	14·5	12·6	7·4	1·85
Silkstone Nuts . .	10,800	15·85	12·66	6·0	0·69

NOTE.—The illuminating power of the Gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

OFFICES, 34. LONDON WALL, CITY, E.C.

TANGYE BROTHERS & HOLMAN,

10, LAURENCE POUNTNEY LANE, LONDON, E.C.;

And BIRMINGHAM (TANGYE BROS.), CORNWALL WORKS, SOHO.

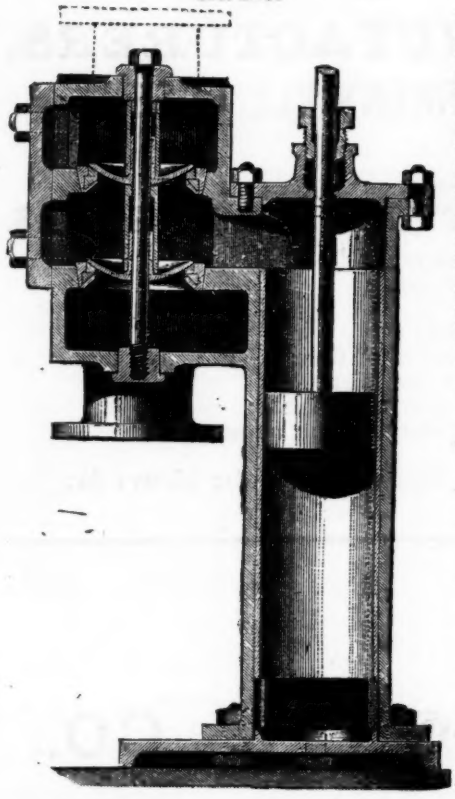
HOLMAN'S PATENT DOUBLE-ACTION VERTICAL PUMPS.

These Pumps deliver a continuous stream equal to the area and traverse of the piston; the piston is solid and has no valve in it like an ordinary pump-bucket, but each side—*i.e.*, the top and bottom sides of the piston, communicate with two pairs of valves, each side having its suction and delivery valve, which act alternately with the up and down movement of the rod; the water passages are so arranged that the whole of the valves are placed in one valve-box, and by the removal of a single plate, access is permitted to the whole of the valves simultaneously. These Pumps are fitted throughout in a substantial and workmanlike manner, and are adapted for all ordinary and extraordinary purposes of pumping. They effect great economy in first cost, space, wear and tear, and are fast superseding the costly and complicated three-throw Pumps, with their cumbrous detail of cranks, strap-heads, slings, guides, stuffing-boxes, and a host of screws, cotters, covers, and doors.

Since the introduction of these Pumps they have been further improved by the application of

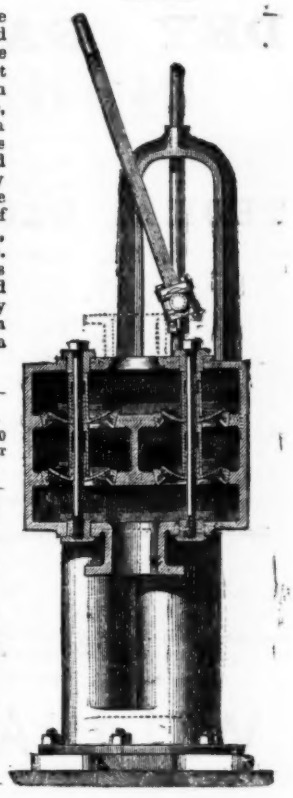
HOLMAN'S NEW PATENT BUFFER VALVES & SEATS,

No. 210.



Which have been designed with a view to obtain an increase of speed with comparatively little noise or concussion, and thereby to increase the relative duty of the Pumps. These Valves have recently been applied with the greatest success to the "Special" Steam Pump, which can be run at 100 strokes per minute with considerably less noise, concussion, and wear in the Valves than takes place with those of an ordinary Pump, running at only 30 strokes per minute. In these Valves the usual centre seat and grating, peculiar to disc Valves in general, are entirely done away with, so that when the Valve is open a free and unobstructed course presents itself for the passing of any large substances that would choke an ordinary Valve, and cause delay and loss by the stopping of the Pump. Holman's Patent Valves are suitable for boiling hot as well as cold fluids, of various properties and densities, and they are so constructed that new seats (which are the only wearing parts) can be applied by any unskilled person in a few minutes, rendering the whole equal to new at a comparatively trifling cost.

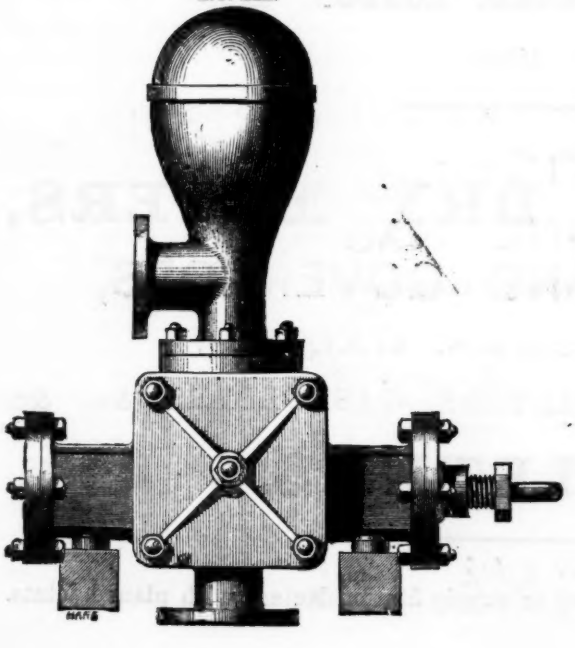
No. 211.



Diameter of Barrel.	Length of Stroke.	Iron Barrel finishing at Rod, as No. 210.	Brass Internal Barrel finishing at Rod, as No. 210.	With Slings, Guide & Standard as No. 211 extra.		Gals. per Hour at 40 strokes per Minute.
3 in.	10 in.	£11 10s.	£13 0s.	£1 5s.	Without Brasses.	1,000
4 ,,	10 ,,	12 10	14 0	1 5		2,000
4 ,,	12 ,,	14 0	16 10	1 10		2,500
4½ ,,	10 ,,	15 10	17 10	1 10		2,500
4½ ,,	12 ,,	16 10	18 0	1 15		3,000
5 ,,	12 ,,	19 10	23 0	1 15		3,300
5 ,,	15 ,,	21 10	24 0	1 15		4,000
6 ,,	12 ,,	22 0	25 15	3 0	With Brasses.	5,800
6 ,,	18 ,,	26 0	30 0	3 15		8,500
8 ,,	15 ,,	30 0	34 10	4 10		12,000
8 ,,	18 ,,	35 0	40 0	5 0		14,000
8 ,,	24 ,,	40 0	45 10	5 15		18,000
9 ,,	18 ,,	43 0	52 0	6 5		18,000
10 ,,	18 ,,	60 0	70 0	9 0		22,000
12 ,,	24 ,,	80 0	95 0	12 0		40,000

HOLMAN'S PATENT DOUBLE-ACTION HORIZONTAL PUMPS.

No. 212.



Fitted with Holman's (new) Patent Buffer Valves and Seats.

These Pumps (the principle of which is described above) are suited for general purposes, and may be rendered available by Engineers and others for their own use and application. It is very expensive to make a set of patterns for a single Force-Pump, and some simple arrangement that can be generally applied will be of great service to the trade generally. They are fitted with Holman's Patent Buffer Valves and Seats, and have a capacious Air Vessel. All the Valves are readily accessible by the removal of a single door.

These Pumps are made of all sizes, from 3 in. to 12 in. diameter, and with either Iron or Brass internal Barrels. The delivery flange can be shifted to any required angle.

Diameter of Barrel.	Length of Stroke.	Iron Barrel finishing at Rod.	Brass Internal Barrel finishing at Rod.	Gals. per Hour at 40 strokes per Minute.
3 inch.	12 inch.	£12 0s.	£14 0s.	1,350
4 ,,	12 ,,	14 0	16 10	2,500
5 ,,	12 ,,	19 10	23 0	3,300
6 ,,	12 ,,	22 0	25 15	5,800
7 ,,	12 ,,	25 0	29 10	7,500
8 ,,	18 ,,	35 0	42 0	15,000
9 ,,	18 ,,	43 0	52 0	18,000
10 ,,	18 ,,	60 0	70 0	22,000
12 ,,	18 ,,	75 0	90 0	30,000

Solid Brass Pumps, with Copper Air Vessels, extra, according to size.

These Pumps are also supplied fitted for driving by strap from shafting overhead, and are then mounted on cast-iron Bed-plate and fitted with crank-shafts, fly-wheel, and riggers, or gear and rigger, &c.

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. The SIX MEDALS AWARDED to THOMAS GLOVER for Paris, 1867.

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF

PATENT WET & DRY METERS,

STATION-METERS AND GOVERNORS,

PRESSURE REGISTERS, GAUGES,

EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c., &c.

WATER METERS.

W. P. & Co. beg to state that they are now prepared to supply Station-Meters with planed joints.

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TO CORRESPONDENTS.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JANUARY 17, 1871.

Notes upon Passing Events.

THE advantages of our climate are also our troubles. The variations that make the land fertile and the people laborious require, if perfect management is to be obtained, very opposite treatment. A few years ago we had two rainy seasons in succession. Then the inventive world was called on to furnish schemes for drying fodder. The inventors answered the call bravely. The Society of Arts offered a prize, and awarded it. What becomes of all the meritorious people and things the society has been rewarding this hundred years? Then dry seasons followed. Water failed not only to the agriculturists, but to the model water-works of Manchester. Schemes for the storeage of waste water very properly exercised the minds of engineers for the ensuing year. Now the subject is the snow in the streets, or will be, unless a thaw as sudden as the last comes in to damp discussion just as it is getting hot in vestries. Of course, this feebleness of the public mind is very aggravating to the theoretically perfect philosopher; although even he cannot always lay his hand on his carefully stowed away flannel jackets or winter wraps, when a cold season unexpectedly sets in at the wrong time of the year. The fact is, we are made so. We do not, and cannot foresee remote contingencies. Fault is only to be found where the builder or the engineer has the means and does not do the work. As for drying agricultural grasses by machinery, we do not say the thing is impossible, or might not pay the owner of irrigated meadows of great extent—that remains to be proved; but we do say that it will never pay an ordinary farmer to make preparations at any cost of capital for events so rare as a wet season in England. The necessity for the storeage of water has been insisted on with much force by the best agricultural engineers. The altered circumstances of the country require it. The daily drawing away of rainfall by artificial drainage calls for some compensatory measures. But this must be a district—a local rather than a personal undertaking, to be again discussed on the recurrence of the next droughty season. But the evils of frost to water supply are so evident that it is astonishing they are not made the basis of some authoritative advice, if not enactments. We do not remember ever seeing or hearing, in the instructions of architects engaged on mansions or public institutions, of the necessity of a provision for preserving the water-supply pipes and cisterns against the effects of frost. Yet the inconvenience recurs almost periodically, to the great cost of water companies, cost and inconvenience of householders, and advantage of plumbers. Would it not be wise that the water companies should issue detailed instructions for the management of pipes in houses already built, as well as in houses about to be built? We are really afraid to suggest any additions to the powers of the district surveyors under the Metropolitan Board; but, whenever the Building Act is amended, there are many clauses that might with advantage be expunged, many powers of useless annoyance for increasing the fees of the surveyors abolished; while, at the same time, simple regulations for the protection of water-pipes from frost might be introduced. That it should be necessary to open temporary water supply from the main in every street is simply ridiculous. Why should not the turncocks, so punctual in applying for Christmas-boxes, distribute printed directions for the management of water-taps at the commencement of every winter? But, even in costly mansions, the protection of the water supply from frost is often overlooked.

As to clearing the snow from the streets, there is only one rational way of meeting an expense that must be extra and exceptional. The cost of an ordinary heavy fall is estimated by competent authorities in the metropolitan district at above one hundred pounds per mile—a cost likely to be rather exceeded than diminished as the open places where loads of snow might be shot diminish in number. It is easy to find shovels, possible to find carts and horses—difficult to find men willing to do a shilling's worth of work for a shilling. The St. Pancras surveyor, Mr. Booth Scott, tells a story that would be confirmed by all who have tried the experiment. The able-bodied men who traversed the streets roaring "We have no work to do-o-o," absolutely declined the snow labour test, singing being much easier and more profitable than shovelling. Still men are to be found, who, under competent overseers, will get through the work somehow. The cost should be met by a snow fund to be distributed by a small extra rate over a series of, say, three years, so that the fine

open winters should pay for the snow and frost. As to footpaths in the metropolitan district, the police may be depended on for enforcing regulations. In the City it is not to be expected that policemen will be hard upon the Common Councilmen-shopkeepers, who may have to decide on their pensions and promotion. One thing has been finally ascertained this winter—namely, that in the present size of the metropolis no heavy fall of snow can be carted any distance; it must be partly shovelled down the sewers, partly heaped up in vacant places like St. Paul's Churchyard, and partly cast into the Thames. Any of the expedients carried out injudiciously will lead to inconvenience.

Mr. Ayrton has found the combined opposition of the London builders too strong for him, and agreed to modify the terms for the contracts for the foundations of the Law Courts. In this instance Mr. Ayrton's character has been of service. The builders knew that any terms they agreed to and signed Mr. Ayrton would enforce. From time immemorial it has been the habit of certain Government departments to invite tenders on terms which were never enforced. This was one prolific source of jobbery at the Admiralty until Mr. Childers and Mr. Baxter took the matter in hand. The system was to tender, at an impossibly low figure, for what would never be required, and make the profit on other articles. It was thus the late Mr. M'Culloch unwittingly introduced a new form of jobbery into his reform of the Government Printing Department. Instead of fixing a fair scale of prices for all work, he accepted tenders of great firms for printing parliamentary documents at a fabulously low price, thus practically excluding competition; the favoured and successful tenderers made their profits by the extras, which on such work exceed the original copy by 50 per cent. At the last International Exhibition the catalogue was offered to public competition, and awarded to a printer who was permitted to use a type one size smaller and paper inferior to the sample. If he knew this before he tendered, he was making a safe offer. To the farce of competition under the form of City Corporation tenders we have before referred. Tenders have their use, but may easily be the foundation of gross jobbery on either side. For years the dust and scavenging contracts of the City of London were settled practically at a knock-out dinner of the dust contractors.

The Earl of Derby has managed, with his usual good hard common sense, to make three practical suggestions on the subject of organized national defence—that militia should be raised, not by undiscriminating ballot, but by districts, each to furnish a certain number of men, thus avoiding the injustice of a ballot, which would compel those only to serve who could not find a substitute. Lord Derby would tax the whole district locally taxed, and thus pay those who chose to serve. He also suggested that the mitrailleur was a light weapon suitable for defence and to the powers of volunteers. But all will be naught, unless at head-quarters in the Horse Guards, at the War Office, amongst our generals, and other officers commanding our regiments, merit, intelligence, zeal, and industry be not the prospect to promotion. Military skill only actual war can test; but solid qualities are proved in time of peace. At present, at every military institution, the real students—*the saps*—are despised; the gay idlers, "the brave, pleasant, ignorant gentlemen," as the *Saturday Review* terms them, much admired; and that is the tone of the army. Lord Derby justly observed that in a mechanical age England ought to be able to hold a first-rate position; but that is not our official system. Young unscientific generals, who have served in infantry or only in cavalry, command officers of the class of Colonel Chesney, of the engineers; while engineer officers, who know nothing of railways or railway traffic, are sent to report on railways with as much use as if the printer of a daily paper were made an official. Our military system must be made like our law system, if it is to inspire the respect of Europe; no men placed in prominent command who have not proved their capacity, and no men in inferior command of absolute incapacity.

A new scheme has been matured for giving additional facilities to the Midland Railway to communicate with the south-coast lines, and for remedying the gross blunder that was committed when the Euston Square authorities refused any connexion with the Underground system. Nothing could have been more inane that the conduct of the traffic managers of this great system; for they, we understand, are answerable for the Euston station being left out in the cold. The expedients of a roundabout extension to Victoria, and that costly, necessary, tardy advance to Euston Road, are almost childish when we remember the frigid pride with which, a few years ago, suggestions from outsiders were received for cultivating closer connexions with the metropolitan traffic. Now—rather late—counsels of wisdom have penetrated in the London and North-Western board-room. It is seen in the improvements of the North London circle. As to this new scheme, we do not know what to say to it. It will be very costly, very convenient for south-coast passengers; it will effect a great street improvement, and do at a vast expense what might have been done ten years ago very cheaply. A scheme, for which an Act was obtained a few years ago, on the same idea as the present plan, has been dropped. No wonder; the promoters undertook to excavate the whole length of Tottenham Court Road, with one shaft only at either end. The present plan—approved, if not designed, by no less a personage than Mr. Hawkshaw—starts with forks from both the Midland and the Euston, passes *under* the Metropolitan, with an exchange platform at or about the Gower Street station, and, coming out at the Holborn end of Tottenham Court Road, proceeds, by way of a new street, to Leicester Square, where a station is to supersede the maimed statue of James II., and thence with a fork join the Charing Cross line—a station to be formed on the north side of the Strand, thus accommodating passengers by the Cannon Street branch. We omit minor details. The promoters, who include the two great railway Boards on the Euston Road, expect to get substantial assistance from the Metropolitan Board towards executing the much-needed street communication from Holborn to the Strand. They also claim to form a railway connexion at Charing Cross, from which the Metropolitan lines were intentionally shut out by the jealousy of the South-Eastern. The public have every reason to wish the scheme success. If carried, it will be only one more example of how much more elastic in England is private enterprise than Government management; for, whether it is a railway or a railway station, a gun or a ship, a Government will make it do until some great catastrophe proves the necessity of a change. It took our war authorities eleven years and the Prussian War of 1866 to find out the value of a breech-loading arm of precision. Yet the humble Spencer repeating rifle was pressed upon them by distinguished officers shortly after the Crimean War.

There is one serious grievance on all the metropolitan lines, of both the inner and outer circles, which might be very easily remedied. We refer to the difficulty of ascertaining the name of each station as the train stops, especially at night—a difficulty increased on the Metropolitan by a swarm of advertising boards, amongst which the *Daily Telegraph* is much more conspicuous than any station name. The remedy is to be found in an imitation of the concert-hall system. Their transparencies no one can mistake, night or day. A large expanse of canvas or glass, no matter which, with the name of the station as large as the name of Sam Collins—whoever that illuminated worthy may be—would lead to few mistakes by day; at night any error would be impossible. Another plan would be to paint the names on all the lamps and on the windows of the waiting-rooms. At present the oldest traveller must be as careful as a young man from the country, or he will find himself at the wrong end of his journey.

In a thoroughly practical letter, "A Locomotive Engineer" of "one of the best signalled lines in the kingdom" contradicts one of our conclusions, but fully confirms our other suggestions on the subject of railway reform. He says:

> I assert with the utmost confidence that the expense of running express trains of moderate size and weight, over which the engines have complete control, is less costly per train mile than that of ordinary trains, provided the machinery and the railway are kept in good working order. Locomotives running express trains consume from 10 per cent. to 25 per cent. less fuel—which, in other terms, means power—than ordinary passenger trains, and the wear and tear to the locomotive is certainly not increased. Passenger trains, with the engines and carriages coupled together, run with comparative steadiness; but heavy goods and mineral trains, with long couplings, oscillate to a very considerable extent, and do far more damage to the line than either fast or slow passenger trains.
>
> Experienced platelayers have frequently told me that goods trains "knock their line out of order," and most of them believe that express trains do comparatively little damage.

He considers that the breaks should be under the control of the engineer as well as of the guard, "who is frequently sorting his "parcels at the most critical moments." He says:

> It has frequently been suggested that four lines of rails should be used upon many of our main lines. Estimates have been prepared of the cost of laying down extra lines on many of our railways, but it has been ascertained that in almost every instance the cost of two additional lines would be nearly equal to the construction of a new railway.

But he is convinced "that the traffic upon the principal lines "could be safely doubled by the introduction of a more perfect "system of sidings and organization of the trains," with the best system of signalling. Until recently railway managers and directors were more intent on extending their territory than on discovering the means for facilitating traffic, and would willingly spend millions on the one, while they grudged a few thousands on the other; but healthier views are beginning to prevail about military inspection. He says:

> The general managers of railways have for the last twenty years been engaged in an incessant warfare with each other, endeavouring to carry their lines into each other's districts, and comparatively little attention has been given by these gentlemen to the working of the railway system.
>
> I would not have believed it possible, twenty years ago, that the present traffic could have been conveyed upon our railways, but I am now convinced that the traffic upon the principal lines could be doubled by the introduction of a more perfect system of sidings and organization of the trains.
>
> The constitution of the Railway Department of the Board of Trade is most unsatisfactory. Endless disputes and antagonism between railway companies

and the Railway Department have resulted from the present system of appointment. Railway inspectors are selected from the Royal Engineers, and are sent to inspect and pass railways that have been constructed by our most eminent engineers. They are also sent to report upon railway accidents, without the slightest previous knowledge or experience of the practical working of railways. The inspectors are men of undoubted ability, and in the course of time they gain a good deal of practical knowledge; but, as their investigations of railway accidents only extend to cases in which passengers are injured, their knowledge of the working of railways must necessarily be comparatively limited. The inspectors are appointed for ten years, and at the end of that period they generally join their corps, and I believe Colonel Tyler is the only Government inspector who has remained in the Railway Department for a longer period. If railway inspectors were selected from the most able of the railway staff, increased confidence would be given to their opinions; and, if the Board of Trade were fortified by the opinions of the most experienced and practical men, they would frequently be able to enforce their views with much greater success than at present.

I have frequently heard it expressed by railway officials that the present construction of the Board of Trade is upon the whole satisfactory, because, if the inspectors were practically acquainted with the details of our railways, they would be far more troublesome. In this view I have never concurred, as I have always been of opinion that if improvements can be made that will bring safety and efficiency, a little outer help is of advantage.

We are glad to find that an influential interest, represented by no less a Cabinet Minister than Mr. Robert Lowe, has bestirred itself to oppose the delusion and job of an Indian Engineering College. Haylebury was dissolved with the East India Company, and now the country or the Government of India is asked to seek capital in an engineering Haylebury, where a small number of pupils are to be crammed with the ideas of a small staff of professors, and sent forth to monopolize all the best engineering appointments on works prepared for a hundred millions of Indian subjects. A deputation from University College—the most powerful division of the London University, whose parliamentary representative is the Chancellor of the Exchequer—headed by Mr. Grote, the President of the Council, has waited on the Duke of Argyll to present a memorial from the Council and Senate against the proposed engineering college for the Indian service. The memorialists contended that now that the salaries offered to young engineers competent to pass the examinations for Indian service had been raised to a figure which would make them real prizes, there would be plenty of candidates, and ample inducement to the colleges forming the London University to pay the needful professors salaries which would procure the services of competent men. The same inducements would prevail in Scotland. They also with great truth and force maintained that the proposed college would be prejudicial to the service, by narrowing the field for the selection of candidates, and limiting the means of obtaining the requisite instruction. They might have added that such centres of manufacturing industry as Manchester, Leeds, Newcastle-on-Tyne, Liverpool, as well as London, are the fields from which the most suitable candidates could be gathered, where the theoretical instruction of first-class college professors could, without extraordinary expense, be supplemented by workshop examples and practice, and where subordinate assistants, in the shape of skilled mechanics, might easily be obtained. Government colleges have been far from a success. How often have the shortcomings of Woolwich and Addiscombe been the subject of investigation? If the Duke of Argyle's project is discussed it must fall through, for it will not bear light or discussion. It is just a *doctrinaire's* dream.

The small-pox spreads in the metropolis and elsewhere. No wonder, with such feeble legislation. Under the Vaccination Act the parent who refuses to have his child vaccinated is liable to a fine of from 1s. to 20s. Those who know anything of the ignorance and fanaticism of the sort of people who oppose vaccination will understand how easily any fine is paid by the subscriptions of sympathizing neighbours equally ignorant. There is only one remedy, and that will be forced upon the Legislature by the recent outbreak of this fatal and disgusting disease. An Act must be passed under which the magistrate, without any discretionary powers, will fine the rebellious parent, and order the neglected infant to be at once vaccinated by an official vaccinator. Of course there will be an outcry by the fanatics, whose love of liberty carried out to its conclusions would abolish all police. The late Mr. Sturge, of Birmingham, was so consistent in his peace principles that he refused to give any information towards prosecuting a thief who had stolen his watch; but on such principles civilized society could not hold together. The silly men, the strong-minded and nasty women, who have banded together to obstruct the working of the Contagious Diseases Act have had their share in cultivating the opposition to vaccination. They must be met in their own way, disgusting as it is, and much as every decent man and woman must regret the necessity. When the commission now taking evidence on the anti-venereal Act have concluded their labours and published their report, the whole business must be plainly discussed in Parliament. It seems that in this country reforms cannot be effected by decrees, or even by Acts of Parliament, without previous discussion. In this case, those who have young wives or intelligent, innocent virgins under their charge will suffer and have to bear it. As it is, well-educated but not strong-minded mothers complain that they cannot take their daughters into what is called intellectual society without exposing them to surgical lectures on subjects formerly reserved for professional men. Those who once advocated the suppression of reports on the Contagious Diseases Act now give way, and think that the immodest women who discuss the subject should be treated as plainly as if they were medical students attending the Lock department of an hospital.

THE GAS BILLS FOR 1871.

The Gas Bills to be presented to Parliament in the coming session other than those which will be brought in by the Board of Trade to give effect to orders obtained under the provisions of the Gas and Water Facilities Act, number in all thirty-eight. Of these, eight are intended to confer further powers on companies and Corporations already possessing statutory rights; seventeen are to incorporate existing companies hitherto without parliamentary powers; three are to enable Corporations to start competing works; and ten are to empower Corporations or other local authorities to purchase the gas undertakings of their respective localities.

The applications for further powers are as follows:—

The Bill of the *Alliance and Dublin Consumers Gas Company* is promoted to amend the Alliance and Dublin Gas Act, 1866, so as to remove a doubt whether or not the mains and pipes of the company are liable to be assessed to rates, other than poor-rates, during the existence of a contract made with the Corporation of Dublin. Power is also sought to dispose of some superfluous land; and it is further desired to repeal a part of the Act of 1866 which makes the consent of occupiers of dwelling-houses within 200 yards of a site necessary before storeage works can be erected. This provision, if carried, will form an important precedent. Section 10 prescribes an illuminating power of 16 candles when tested with Sugg's new "London," or other burner adopted by the referees under the City of London Gas Act. The gas is not to contain more than 20 grains of sulphur, estimated by means of Dr. Letheby's apparatus, and is not to have more than 5 grains of ammonia in 100 feet. The company is to maintain a testing-place and apparatus, and the Corporation of Dublin or two justices may order an examination, which must be made within the hours prescribed by the London referees—*i. e.*, from 5 p.m. to 8 p.m. in winter, and from 8 p.m. to 11 p.m. in summer. This Bill imposes no penalties for deficiency of illuminating power or excess of impurities, but does impose a penalty of £5 per day on any person who consumes gas without giving notice to the company, and allows summary proceedings to be taken against any consumer who does not pay within 14 days after demand.

The *Boston Gaslight and Coke Company*, with a present paid-up capital of £20,000, seek power to raise an additional £30,000 by the issue of new ordinary £10 shares, to be sold by auction after due advertisements. Any premiums realized are not to be capital entitled to dividend. The dividend on this new capital is limited to 7 per cent., and no deficiency is to be made good after the expiration of four years. Borrowing power to the extent of one-fourth of the capital is applied for on the usual conditions. One clause amends the scale of votes the proprietors are entitled to at general meetings. Holders of £50 and upwards to £100 are to have one vote, and so on up to £1000 or more, which confers ten votes, the largest number one proprietor can exercise.

The *Burnley Borough Improvement Bill* includes various provisions respecting the supply of gas and water. The Corporation of Burnley, owing at present about £20,000, and possessing no further borrowing powers, seek authority to raise £80,000, of which £20,000 is to be applicable to the gas undertaking, and £30,000 to the water supply. The sum applied to gas purposes is to be paid off within 30 years, a thirtieth part of the amount borrowed or remaining unpaid being set apart for the purpose annually out of the borough fund, and invested in Government securities. As regards the supply of gas, the Corporation wish to extend their district beyond the borough by including the townships of Habergham Eaves and Reedly Hallows. They wish also to enlarge their works, to acquire land to the extent of ten acres, and to obtain all the powers usually accorded to gas companies and corporations supplying gas. The maximum price of gas is to be 3s. per 1000 feet, but power is asked to supply certain public institutions gratuitously. The illuminating power is to be 15 candles, tested by a 15-hole Argand, with 7-inch chimney. Nothing is proposed with regard to impurities. The common provisions for testing are to be made, and the fine for a deficiency of illuminating power is not to exceed £20. All penalties recovered from the Corporation are, unless otherwise ordered, to be paid to the overseers of the poor. The Corporation may require security from consumers, and if the security be the deposit of money, interest at the rate of 5 per cent. is to be paid. A reserved fund for contingencies, which is never to exceed £5000, is to be formed out of profits of the gas undertaking only.

The Bill of the *Chartered Gaslight and Coke Company* is to

authorize the company to make a short railway to connect the Beckton works with the Great Eastern Railway, to confirm the amalgamation with the Equitable Company, and to amend the Metropolis Gas Act of 1860 and the City of London Gas Act, 1868, and for other purposes. The railway is to be made at the joint expense of the gas company and the Great Eastern Railway Company, if a majority of the shareholders in the latter think fit to subscribe to the undertaking, and if not by the gas company alone. The Bill is also to give power to the company to take land adjoining the works of the late Great Central Company, and to erect and maintain thereon works for the manufacture and storing of gas. The Equitable Company is to be dissolved on the 1st of January or July, whichever happens first after the passing of the Act, after which all the debts and liabilities are to become a charge upon the united company, subject to any rights of priority. The various Acts relating to the amalgamating companies are to remain in force, and all rights and power conferred are to be enjoyed and exercised by the united company, subject, however, to the proviso, that if anything therein be inconsistent with the Act of the Gaslight and Coke Company, the latter is to remain in force and be observed by the united company. The capital of the united company will be £2,450,000. We have previously mentioned the distribution of the shares into A, B, and C shares, in connexion with the amalgamations with the City of London and Great Central Companies, and now need only add that every shareholder in the Equitable will, in respect of each £50 share fully paid up, be entitled to two D shares of £25 in the united company, which, subject to the payment of a dividend on certain A and C preference shares, will be entitled to a preferential dividend at the maximum rate of 10 per cent. The Act will transfer all the borrowing powers of the amalgamating companies to the united company.

The directors of the amalgamating companies are to remain in office until the period at which they would have retired if this Bill had not passed; and until the number is reduced below twelve no new ones can be elected. The number of directors of the united company is not to be fewer than nine nor more than twelve. Provision is made for the gradual reduction of the remuneration to directors, which, beginning in the first year at £7300, is to be reduced in the tenth and subsequent years to £4000. Provision is also made for the payment of compensation, by way of annuities or otherwise, to officers and servants removed from office, on the same plan as was carried out in the previous amalgamations. Power is taken to dispose of lands, &c., not required for the purposes of the undertaking of the united company. Section 54 of the Bill extends the amalgamating clauses of the City of London Act, 1868, to all the companies under the Metropolis Gas Act, 1860. The clauses further amending the Act of 1868 require that all the chemicals and other materials employed in testing gas under that Act shall be prepared under the direction of the referees, and be certified by them; that the testing-places shall be open to the referees at least twice a month, for the purpose of ascertaining that all the apparatus is in order, and if any be found defective, the testings are to be discontinued until the apparatus is repaired to the satisfaction of the referees. It is also asked that the company may have power to examine into the condition of the testing apparatus once a week. Section 58 prescribes that the testings shall be made by the appointed examiner at the testing-place, and by none other, and nowhere else. In the event of any deficiency of illuminating power or excess of impurity, the examiner is, within one hour, to deliver notice thereof in writing to the superintendent of the station at which the gas was made. The average of the testings for six successive days is to be deemed to represent the illuminating power for one week; and lastly, it is provided that if in any week the illuminating power is not equal to the prescribed power, the company shall forfeit a sum not exceeding £10 for each million of cubic feet made during the week at that station; and if in any week the amount of impurity in any form has exceeded the maximum allowed for that form, the company shall forfeit a sum not exceeding one pound for each million of feet manufactured at the station; provided that no single forfeit for deficiency of illuminating power shall exceed £250, and no penalty for excess of impurity shall exceed £25: provided also that no forfeiture shall be incurred when it is proved to the satisfaction of a magistrate that the matter complained of was occasioned by unavoidable cause or accident. Any fines are to be paid to Her Majesty's Treasury. Section 68 makes the reasonable provision that the company may refuse a supply to persons who have quitted premises in another part of the metropolis, and left their gas bills unpaid.

The *Chesterfield Water-Works and Gaslight Company* promote a Bill to enable them to raise additional capital and take land for the enlargement and improvement of their water-works only.

The *Glasgow Corporation Gas Bill* is to authorize them to take additional lands and erect new gas-works, and to discontinue the works known as Townhead Gas-Works. For these purposes power is asked to apply money raised, or authorized to be raised, by the Act of 1869, and not required for the purposes of that Act.

The *Ilkley Gas Company* ask for power to take additional lands for the erection of works, and for these purposes to apply money authorized to be raised under their Act of 1869. And since by that Act the company were required to have a testing-place not nearer than half a mile to any of their works, and their pipes do not extend so far, they apply for power to maintain a testing-meter at their works for the time being.

The *Southport Improvement Bill*, among other things, is to authorize the Corporation to extend their gas limits and improve and enlarge their gas-works. The limits they ask for are "all "places within a circle of a radius of six miles, measured from "the town-hall, Southport." For the erection of new works they wish to purchase a plot of land about five acres in extent, situated outside the limits of the borough. The maximum price of gas is to be 4s. per 1000 feet, and the quality is to be 20 candles, "unless prevented by unavoidable cause, failure of cannel "coal, or other accident, or during necessary repairs." Power is sought to raise £135,000, of which £90,000 may be expended for gas-works, markets, town-hall, park, and slaughter-houses. The Bill includes some usual provisions for preventing waste or misuse of gas.

The *Warrington Gaslight and Coke Company* promote a Bill to extend their limits by including various townships and places within the counties of Lancaster and Chester. They seek power to raise additional capital to the amount of £105,000 in new ordinary or preference shares of £20 each, and to borrow a sum equal to one-third of the new capital. No money, however, is to be borrowed until the whole of the new capital has been issued and half paid up. Power is also asked to issue debenture stock, the interest on which the Bill does not propose to limit. The company ask for power to manufacture or deal in meters, fittings, &c., and to use patent inventions. Most of the ordinary rights and privileges are provided for in the Bill. The gas to be supplied is to be of such illuminating power as to produce from a union or fishtail burner consuming 5 feet per hour a light equal to 14 candles. The company is to provide a testing-place. Two justices, on the application of five consumers, may order an examination, and the company may be fined £10 for any proved deficiency in the illuminating power. The Bill proposes no limit to the price of gas, nor asks any power to purchase additional land for the erection of new works.

The following are the applications from non-statutory companies for incorporation and parliamentary powers:—

The *Aberdare Gas Bill* is an amended Bill promoted by the Aberdare Gas Company, who failed last year to obtain an Act of Incorporation. The present Bill makes the usual provisions for the dissolution and reconstitution of the company. The capital now proposed is £10,500, of which £6000, representing the original share capital, is to be called A stock, and £4500, representing money borrowed and money expended on works out of profits, is to be called B stock. The former is to be allotted rateably among the holders of original shares; the latter is to be issued as fully paid up, and applied to the payment of £3000 borrowed by the original company, and the balance is to be divided rateably among the holders of A stock in discharge of all claims to arrears of dividend. The company is never to divide more than 5 per cent. on B stock; but there is no limitation to the dividend on A stock. It is not proposed to further increase the capital. Power is sought to borrow £2600, and to acquire two acres of land. The limits of district now proposed are so much of the parish of Aberdare as lies within a radius of a mile and a half from the Aberdare post-office. The maximum price of gas is to be 4s. per 1000 feet, and the illuminating power is to be 14 candles tested by "an Argand burner." The gas is to be free from sulphuretted hydrogen and ammonia. The usual provisions for testing are made, the penalty recoverable being £20. All the usual powers and privileges are, of course, provided for in the Bill.

The *Gas Company of Aberdeen*, formed by a contract of copartnery, promote a Bill to dissolve the original company and reincorporate it with statutory rights and powers. The capital of the company is to be £80,000, of which £65,000 represents the original capital, and £15,000 "additional," to be raised "in "a manner hereinafter named," but which is not specified, unless the amount be included in a sum of £25,000 to be raised for the construction of new or enlargement of old works. The original capital is to be converted into consolidated stock, and divided among present proprietors in proportion to their shares. The additional capital is to be raised by the creation of new stock, the dividend on which is limited to 5 per cent. Borrowing power

to the extent of £20,000 is asked for on the usual conditions. Power is sought to acquire land, by agreement, to the extent of five acres in all. The maximum price of gas is to be 5s. 5d. per 1000 feet, and it is to be of such a quality as to produce from a 15-hole Argand burner with a 7-inch chimney a light equal to 30 candles. Nothing is said about impurities. A testing-place is to be maintained, and the usual provisions are made with regard to testings, a penalty of £20 being recoverable for proved deficiency of illuminating power. Gas is to be supplied to public lights at the lowest charge made to private consumers, and it may be charged for on average meter indication. All the customary powers are provided for in the Bill.

There are two Barnet Gas Bills—one promoted by certain persons who have contracted to purchase the undertaking of the Barnet Gaslight and Coke Company, the works of which are leased to the Messrs. Douglas, whose term expires on the 31st of March, 1873; and the other promoted by the Messrs. Douglas and others, who propose a rival scheme. The limits prayed for are nearly the same in the two Bills. In the first case it is proposed to form and incorporate a company, with a capital of £25,000, in £10 shares, not to be issued until one-half is paid up. Borrowing power to the extent of one-third of the capital is sought for, and also the right to issue debenture stock, the interest on which is not limited by the Bill. The old company is to sell their property and undertaking to the new within six months after the commencement of the Act, subject, of course, to the temporary rights and interests of the present lessees. All the usual rights, privileges, restrictions, and penalties are provided for in the Bill. The maximum price of gas is to be 6s. per 1000 feet, and it is to have the illuminating power of 14 candles, tested by a 15-hole Argand burner with a 7-inch chimney. The company are to provide and maintain a testing-place and apparatus, to which the local authority, or person authorized by them, is to have access. Any officer of the company obstructing the examiner may be fined £10, and the company, for proved deficiency of illuminating power or obstruction on the part of their officer, may be fined £20. Public lamps are to be supplied at the lowest price charged to a consumer, and, at the option of a local authority, may be charged for on average meter indication, the meters being provided and fixed by the company at the cost of the authority. The second Bill authorizes the incorporation of a company, with a capital of £20,000, in £10 shares. Power is asked to borrow £2000 in respect of the first £10,000 of capital issued and half paid up, and £500 in respect of every additional £2000 under the like conditions, and also to issue debenture stock at a rate of interest not exceeding 6 per cent. Authority is sought to purchase lands described in two schedules (in one of which the land occupied by the works of the old Barnet Gas Company is mentioned), for the erection of works. All the usual powers accorded to gas companies are provided for in this Bill. The maximum price of gas in this Bill is limited to 4s. 6d. per 1000 feet. The illuminating power is to be 14 candles, and the gas is to be practically free from sulphuretted hydrogen and ammonia. The company is to provide a testing-place, with "an Argand "burner capable of consuming 5 feet per hour;" and the local authority, on application of five consumers, may order an examination, and for any deficiency of illuminating power a fine of £20 may be inflicted. The usual provisions are made as to contracts for public lights.

The *Cradley Heath Gas Bill* is to incorporate the Cradley Heath Gas Company with all the usual statutory powers and privileges. The original capital of the company was £5000, in £10 shares, the whole of which have been paid up, and the money expended. Beyond this, the company have expended £6820 out of profit, applicable to dividend on the undertaking. Power is now sought to convert the original capital into consolidated stock and to capitalize the profits expended, and further to raise an additional capital of £8180, in £10 shares, ordinary or preference, so as to make the capital of the incorporated company £20,000. The stock is to be divided among the original shareholders in proportion to their shares, and the capitalized profits, converted into preference stock bearing a perpetual dividend of 5 per cent., is to be divided rateably among the original shareholders. The additional capital is to be raised by the creation of new shares or stock, ordinary or preference, or both. The dividend on this new capital is limited to 7 per cent. on ordinary, or 6 per cent on preference shares. The company having no mortgage debt at present, ask power to borrow £2900 in respect of the original capital, and £2000 in respect of the additional, the latter on the usual conditions. The ordinary provisions for the reconstitution of the company are made in the Bill. In addition to the land now vested in the company, power is sought to purcheae by agreement further, not to exceed in the whole five acres. The Bill will give power to the company to engage in all business incidental to the manufacture and supply of gas, and confer all the ordinary rights and privileges. The maximum price of gas is to be 6s. per 1000 feet, and the illuminating power is to be 14 candles, tested by a 15-hole Argand, with 7-inch chimney. A testing-place with apparatus is to be maintained by the company, and any local authority may authorize a person to test the gas, and a fine of £20 may be inflicted for proved deficiency of illuminating power. In this Bill it is provided that if no penalty be imposed, the cost of the experiment shall be in the discretion of the justices. It is provided in the Bill that public lamps may be supplied at the option of the authority on average meter indication. If any dispute arise between the company and the authority about the accuracy of the registration of a meter, it is to be tested in the manner provided by the 22 & 23 Vict., c. 66, and if it be found to register erroneously, or can be shown to have ceased to register notwithstanding gas may have passed to the burner, it shall not, though it may act correctly when submitted to the test, be deemed a meter from which the average may be determined.

The *Dorking Gas Bill* is to authorize the incorporation of the Dorking Gas Company, hitherto carried on under a Deed of Co-partnership. The share arrangements of this company are singularly complicated, the capital having been increased from time to time by the creation of new shares, which have been divided into five different classes, A, B, C, D, and E. The capital of the incorporated company, until augmented under powers asked for in this Bill, will be £15,000, in £25 shares, which will be divided into two classes only—class A, consisting of 480 shares fully paid up, and class B of 180, on which only £5 have as yet been paid, thus simplifying the original capital account of the company. Power is now sought to raise £15,000 additional capital by the creation of new £25 shares, ordinary or preference, the dividend on which is not to exceed 10 per cent. if ordinary, or 9 per cent. if preference. Immediate borrowing power to the extent of £5000 in respect of the original capital is asked, and to the amount of £3000 in respect of the new capital, under the usual restrictions. The usual provisions are made for the reconstitution of the company, with authority to carry on all the business connected with the manufacture and supply of gas with the customary rights and restrictions. The maximum price of gas is to be 6s. per 1000 feet, and the illuminating power is to be 14 candles, tested by a 15-hole Argand burner, with 7-inch chimney. The usual provisions respecting tests are made, and the maximum penalty recoverable from the company is £20. In this case also it is proposed that, if no fine be imposed on the company, the cost of the experiment is to be at the discretion of the justices.

The *Dunstable Gas and Water Bill* is to incorporate the Dunstable Gas and Coke Company, and authorize them to supply water as well as gas. The original company, which was carried on under a Deed of Co-partnership, is to be dissolved, and reconstituted in the usual manner. The paid-up capital of the original company is £7500, in 500 shares of £10 each, fully paid, and 500 shares of like amount on which £5 have been paid; and the company have expended on their undertaking £2500 out of profits. It is now proposed that, subject to the augmentation to be mentioned, the capital of the company, in respect of their gas undertaking, shall be £12,500, in £10 shares. Of this sum, £10,000, in 1000 A shares, is to be allotted to the original proprietors, subject to all calls, &c.; and the £2500 expended out of profits is to be divided in 250 B shares, to be allotted rateably to the proprietors as fully paid in discharge of all claims to arrears of dividend. In addition to this, it is proposed to raise a further sum of £12,500 by the creation of new C shares, ordinary or preference. The dividend on A shares is limited to 10 per cent., on B shares to 5 per cent., and on the new or C shares to 7 per cent. if ordinary, or 6 per cent. if preference. Power is asked for to borrow at once £3000 in respect of the original capital, and from time to time a further £3000 in respect of the new, under the usual restrictions. The Bill gives the company power to engage in all business appertaining to the manufacture and supply of gas and utilization of products, and confers all the usual statutory rights. The maximum price of gas is to be 5s. per 1000 feet within the borough of Dunstable, and 5s. 6d. beyond the limits. The illuminating power is to be 14 candles, tested by Sugg's new "London" or other approved burner. The usual provisions are made with respect to testings, and the company may be fined £10 for proved deficiency of illuminating power, or obstruction to the examiner. The costs of the experiment, in the event of no penalty being imposed, are to be paid by the consumers signing the requisition. Public lamps, at the option of the local authority, may be charged for on average meter indication, under the usual conditions.

The *Kidsgrove Gas Bill* is to authorize the incorporation of the Kidsgrove Gaslight Company, registered under the Joint-Stock Companies Act, 1856, and extend their powers and limits. The present capital of the company is £9235, in £5 shares, and it is sought to raise it to £20,000 in the following way. Existing shares are, of course, to remain vested in the present proprietors, and an equal number of new shares of the same value are also to

be vested in the present proprietors. The Bill then proposes that whenever any shares are newly created for augmenting the capital, they shall first be offered in writing to registered shareholders, and if declined, disposed of for such a sum as the directors can obtain. The dividends are limited to 10 per cent. on the £9235, original capital, and 7½ per cent. on the new. Immediate borrowing power to the extent of £2300 is sought in respect of the original capital, and subsequently to the extent of £2765 in respect of the new, under the usual restrictions. The maximum price of gas within the district of Kidsgrove is to be 5s. per 1000 feet, subject to a discount of 10 per cent. if paid within six weeks from the date of the invoice. Beyond the above limits the price is not to exceed 6s. per 1000 feet. The illuminating power of the gas is to be 13 candles, tested by a 15-hole Argand burner, with 7-inch chimney. The company does not propose to maintain a testing-place, and the Bill imposes no penalty for any deficiency of illuminating power. For the rest the Bill is intended to confer all the usual rights and powers on the company.

The *Northallerton Borough Gas Bill* is to incorporate a company to take over and carry on the gas undertaking of Mr. James Malam, by which the town and neighbourhood have hitherto been supplied. The capital of the company is to be £6500, in £10 shares, and borrowing power to the extent of one-fourth of that sum is prayed. Mr. Malam is to sell the undertaking with all its liabilities to the company within six months of the passing of the Act. All the usual powers of a gas company are provided for in the Bill. The maximum price of gas to private cousumers is to be 5s. 5d., and 5s. for public lamps, if charged for on average meter indication, The illuminating power is to be 14 candles, tested by a 15-hole Argand, with 7-inch chimney. The usual provisions are made with regard to testing; the forfeit for deficiency is not to exceed £20.

The Bill of the *Potter's Bar Gas and Coke Company, Limited*, is to dissolve and reincorporate that company with all the usual statutory powers, and with the customary restrictions. The district at present supplied by the company embraces the parishes of South Mimms and Enfield in Middlesex, and North Mimms and Northaw in Herts. It is now proposed to extend these limits by including the parishes of Monken Hadley and Chipping Barnet, so making this a competing scheme with the two Barnet Bills mentioned above. The capital of the limited company was fixed at £5000, in shares of £5 each; and £2700 have been paid up. That of the new is to be at first £10,000, in shares of £10, which involves the creation of half shares to replace single or odd shares held by the present proprietors, which are to be extinguished as opportunity offers. When the whole of this capital has been expended the company ask power to raise an additional £10,000 in £10 shares, which, at the pleasure of the proprietors expressed at a general meeting, may be divided into preferred and deferred half shares when 60 per cent. has been paid on them, five-sixths of which, or all payable thereon, is to be carried to the credit of the deferred half, and the residue to the credit of the preferred half. The dividend payable on the latter is limited to 6 per cent.; the possible dividend on the former is not restricted in amount. Power is asked to borrow in all £5000, and to issue debenture stock, the interest payable on which is not limited by the Bill. The maximum price of gas is to be 7s. for the first three years, and 6s. per 1000 feet afterwards. The gas supplied is to have the illuminating power of 12 candles, tested by a 15-hole Argand, with 7-inch chimney. The ordinary provisions for testing the gas are to be made, but the Bill requires that 24 hours notice of the intention to test be given, and the penalty proposed for an infringement of the Act, as regards deficiency of illuminating power, is £20. For the rest the Bill proposes to confer all the customary rights with the usual restrictions.

The *Sheppy Gas Bill* authorizes the dissolution of the Sheppy Gas Consumers Company, Limited, and reincorporates the proprietors with statutory rights. The paid-up capital of the limited company is £25,000, in 5000 paid-up £5 shares, 800 of which have been issued as preference shares, and all of which are to be vested in the present proprietors. The new company seek power to raise a further sum of £15,000 by the issue of new £5 shares, to borrow in all £10,000, and to create debenture stock. No limitations are placed on the dividends payable on any part of this capital. The district of the original company included only a part of the island of Sheppy, but it is now proposed to considerably extend it. The maximum price of gas within the present limits is to be 5s., and in the new district 7s. 6d. per 1000 feet. The illuminating power is to be 14 candles, tested by Sugg's new "London," or other approved burner. A testing-place is to be erected within *twelve* months of the passing of the Act, and any Local Board or five consumers, the latter, on application to a justice, may require an examination, which may be made at any reasonable hour in the daytime. The maximum penalty for deficiency of illuminating power is fixed by the Bill at £20. The Bill is intended to confer all the usual rights and privileges on the new company.

The *Thirsk Gas Bill* is to extend the powers of the Thirsk Gas Company incorporated under the Companies Acts, 1862 and 1867. The capital of this company is £12,000, in £10 shares, £10,000 of which have been or soon will be paid up. The capital of the reincorporated company is to be £16,000, in £10 shares, 1000 of which were to be appropriated to the present registered shareholders. The £6000 additional capital may be raised from time to time by the issue of new shares of £10 each, ordinary or preference, or both. The dividend payable on this additional capital is limited to 7 per cent. on ordinary, or 6 per cent. on preference shares. Borrowing power to the extent of one-fourth of the capital is prayed. The limits of the Bill include the parish of Thirsk and the village of Sowerby, in the North Riding of Yorkshire. Gas of 14-candle power is to be supplied, and the price is not to exceed 5s. 5d. per 1000 feet. The Bill makes the usual provisions for testing, and imposes a penalty of £20 for deficiency of illuminating power. All necessary provisions regulating the reconstitution of the company are made, and the usual rights and privileges of gas companies are conferred.

The *Todmorden Gas Bill* is to authorize the dissolution and reincorporation of the Todmorden Gas Company, Limited. The capital of the present company is £20,000, of which £18,875 has been paid up. The capital proposed for the reincorporated company is £40,000, including the above sum, which is to be converted into stock, and divided among present proprietors. The remaining sum of £21,225 may be raised from time to time by the issue of new £5 shares, the dividend on which is limited to 7 per cent. if ordinary, or 6 per cent. if preference. These new shares are to be sold by auction after due advertisement, and any premiums realized are to be considered capital of the company. The limited company have already borrowed £7900; and power is now sought to borrow a further sum of £5000 in respect of the original capital, and a like sum when all the additional capital has been issued and half paid up. Power is also asked to issue debenture stock at a rate of interest not exceeding 5 per cent. The maximum price of gas is to be 5s. per 1000 feet. It is to have the illuminating power of 16 candles, is to be practically free from sulphuretted hydrogen, and is not to contain more than 20 grains of sulphur in any form in 100 feet. The company are to maintain a testing-place furnished with a 15-hole Argand burner, and all other necessary apparatus. Two justices, on application of five or more consumers, may appoint an examiner, who is to have access to the works at any reasonable hour in the daytime to test the illuminating power of the gas. The Bill imposes a penalty of £20 for deficiency in this particular, but makes no mention of a forfeit for excess of impurity. An unusual number of directors—viz., fifteen—are allowed by the Bill, but the number may be reduced to six, All necessary provisions for the reconstitution of the company are made, and all the usual powers are conferred.

The *Wandsworth Gas Bill* is intended to confer all the usual statutory powers accorded to gas companies on the private undertaking of Mr. John Dormay, or his heirs or assigns. The district supplied by this undertaking is the parishes of Wandsworth, Battersea, and Putney. The price of gas is not to exceed 4s. 6d. per 1000 feet, and the illuminating power is to be 14 candles, tested by a 15-hole Argand burner, with 7-inch chimney. The undertakers propose to maintain a testing-place, and any local authority may appoint an examiner, who is to have access to the works at any reasonable hour in the daytime. Any penalty which may be imposed for deficiency of illuminating power is not to exceed £20.

The Bill of the *Watford Gas and Coke Company* provides for the dissolution of limited company, incorporated under the Joint-Stock Companies Acts, and the reincorporation of the proprietors with statutory powers. The original capital of the company is £14,800, consisting of shares of £24 each, fully paid, and shares of £10 each, also fully paid, and other £10 shares, on which £7 have been paid. This capital will remain vested in the present proprietors, and the shares will be called respectively A, B, and C shares. The Bill then proposes to raise the capital to £25,000 by the issue of new £10 shares, ordinary or preference. The dividends payable are limited as follows:—To 10 per cent. on the original capital; to 7 per cent. on the additional, as long as the maximum price of gas exceeds 4s. 6d. per 1000 feet; to 8 per cent. when the price does not exceed 4s. 6d.; to 9 per cent. when the maximum price is 4s.; and 10 per cent. so long as the price does not exceed 3s. 9d. New capital, raised by preference shares or stock, will be entitled to 6 per cent. only. The old company had no mortgage debt, and the Bill gives power to borrow £3000 in respect of the original capital, and £2000 in respect of the additional; the latter under the usual restrictions. The price of gas is not to exceed 5s. per 1000 feet, and the illuminating power is to be 14 candles, tested by a 15-hole Argand burner, with 7-inch

chimney. A testing-place is to be maintained, to which Local Boards, or persons authorized by them, are to have access at reasonable times, in order to test the gas; and for proved deficiency a fine of £20 may be imposed. The Bill confers all the usual powers, and imposes the customary restrictions on the company.

The preamble of the *Westhoughton Gas Bill* sets forth that the Westhoughton Gas Company, Limited, was constituted in June, 1869, for the purpose of making and supplying gas, and doing all other incidental business, with a capital of £10,000, in £5 shares, and that the said company have never erected any works. It further recites that the Westhoughton Consumers Gas Company, Limited, was constituted in April, 1870, also for the purpose of manufacturing and supplying gas to Westhoughton and the neighbourhood, with a capital of the same amount, but in £10 shares. It adds that it is expedient that the company incorporated by this Bill should have power to purchase by agreement the undertaking of the Westhoughton Gas Company, Limited. The Bill accordingly authorizes the incorporation of a company to manufacture and supply gas to Westhoughton, Lostock, Over Hulton, Middle Hulton, and Rumworth, in the county of Lancaster, with power to purchase the undertaking of the company above named. The capital of the new company is to be £20,000, in £10 shares. Holders of shares in the consumers company are entitled to an equal number of shares in the incorporated company. Power is sought to raise an additional capital of £50,000, in £10 shares, which may be divided into preferred and deferred half shares, in the manner provided for, and with the same limitations as in the Potter's Bar Gas Bill mentioned above. Borrowing powers to the extent of one-third of the paid-up capital are asked, and also the power to issue debenture stock. The price of gas is to be 5s. 6d. within a mile of the works, and 6s. beyond that distance. The illuminating power is to be 14 candles. A fine of only £10 is proposed for deficiency of illuminating power. All the usual rights and privileges of gas companies are conferred by the Bill.

The *Whitby Gas Bill* is to dissolve and reincorporate the Whitby Gas Company, Limited, with the usual statutory powers. The original capital of the company is £40,000, in shares of £20 each, which will shortly be fully paid up. These will be appropriated to the registered proprietors. It is proposed to raise in addition £20,000, by the issue of new £20 shares, the dividend on which will be limited to 7 per cent. if ordinary, and 6 per cent. if preference. The limited company had no mortgage debt, so power is sought to borrow £10,000 in respect of the original capital, and £5000 in respect of the new, the latter under the usual restrictions. The limits of the company are the town of Whitby and the village of Ruswarp; and the price of gas is not to exceed 5s. in the former, nor 6s. in the latter. Gas of 14-candle power is to be supplied. The Bill gives all the usual powers to the company.

The three Bills to authorize Corporations to erect competing works are promoted respectively by the Corporations of Aberdeen, Bradford, and Perth. They are simply alternative measures, other Bills, mentioned below, being brought forward to authorize the purchase of the gas undertakings in the several places. The Bills consequently require no further notice.

The ten Bills authorizing the purchase of gas undertakings by Corporations are as follows:—The *Aberdeen Municipality Extension Bill*, which is to authorize the purchase, by agreement, of the Aberdeen Gas Company on August 1, 1871; but if the Town Council and company should not agree on the terms of purchase before that date, the Town Council, on giving six months notice, may make a compulsory purchase on August 1, 1872, by contracting to pay perpetual annuities of 9 per cent. on the £65,000 paid-up capital, and assuming all the debts and liabilities of the company. The Bill makes all necessary provisions for completing the transfer on these terms, and for the redemption of the annuities by agreement with the annuitants. All the ordinary powers and privileges accorded to gas companies are provided for in the Bill. The gas supplied is to have the illuminating power of 15 candles when tested by a union jet burner consuming 5 feet per hour at a pressure of 5/10ths of an inch of water. Nothing is provided with respect to impurities. The usual provisions as to testing are made, but *twenty* consumers must combine to require an examination, and a penalty of £20 may be recovered for deficiency. The Town Council are to fix the price from time to time on an estimate to be made yearly, and any excess of profit is to be carried towards a reduction of price in the year ensuing. To meet any deficiency the council seeks power to assess a "gas contingent "guarantee rate," no limitation to which is made. Power is sought to borrow in all £25,000 on the security of the lands, works, and revenues of the gas undertaking only. A 2 per cent. sinking-fund is to be commenced after three years, to pay off borrowed money; and from the date of the transfer £650 is to be set apart annually as a "contingent-fund," to be applied to the redemption of annuities, and to the improvement and extension of works, &c. The whole of the profits of the undertaking are to be applied to the purposes of the undertaking only.

The *Arbroath Corporation Gas Bill* is a Bill promoted jointly by the Town Council of Arbroath and the Arbroath Gaslight Company to give parliamentary sanction to the purchase of the undertaking of the company by the council, the conditional transfer of which was made to the council on the 30th of June last. The consideration to be paid is perpetual annuities to the shareholders to the amount of £1400 per annum, with the assumption of the debts and liabilities of the company, and the immediate payment of the amount to the credit of the reserve-fund and share premium account. After the passing of the Act, the company is only to subsist for the purpose of receiving and distributing the annuity certificates to the shareholders, and to receive the money above-mentioned. Then they are to cease to manufacture, sell, or supply gas, and the undertaking passes absolutely to the Corporation, upon whom this Bill will confer all the powers and rights usually exercised by gas companies. Power is asked to borrow £25,000 on mortgage, or by way of a cash credit, for the exclusive use of the gas undertaking. The price of gas is to be 5s. 10d. per 1000, and the quality such as to produce from a union jet consuming 5 feet per hour the light of 25 sperm candles. There are no provisions respecting impurities. The Corporation is to maintain a testing-place, and five consumers may, by order in writing, appoint an examiner, who is to have access to the works in the daytime. The penalty for deficiency of light or obstruction to the examiner is as usual £20, The profits of the undertaking are to be applied as follow:—One-third to a sinking-fund for the redemption of the annuities, &c.; one-third to consumers by way of rebate or discount in reduction of price of gas; and the remaining third to public purposes at the discretion of the council. Power is taken to levy a gas guarantee rate in case of deficiency.

The *Bradford Corporation Gas and Improvement Bill*, so far as it relates to gas matters, authorizes the purchase of the undertaking of the Bradford Gaslight Company on terms we have already mentioned. For this and the other purposes contemplated by the Bill, the Corporation seek power to borrow £410,000, on the security of the gas undertaking, gas-rates, and borough funds. The maximum price of gas is to be 4s. per 1000 feet, and it is to have the illuminating power of 15 candles, tested by a 15-hole Argand burner, with 7-inch chimney. The Corporation are to maintain a testing-place, at their principal office or the works, provided with such burner, and ten consumers may appoint an examiner, who is to have access to the place at any reasonable hour in the daytime; and for proved deficiency of illuminating power the Corporation may be fined £20. If no fine be imposed, the costs of the experiment are to be paid by the person complaining. No provisions are made with respect to impurities. The Corporation propose to take all the usual powers of inspection and for protection from fraud, and generally all the rights accorded to companies. No arrangements are made in the Bill as to the application of the profits of the gas undertaking.

The *Chorley Improvement Bill* is to enable the commissioners of that parish to purchase the gas undertaking of the Chorley Gaslight Company, as provided for in the Chorley Improvement Act, 1853. For this purpose and others they seek power to borrow £85,000, of which sum £74,000 is to be applicable to the aforesaid purchase; to the erection of new gas-works, town-hall, and market-place; and to street improvements. No agreement has at present been made with the company, and the Bill provides that if no sale of the undertaking be made within six months of the passing of the Act, the commissioners may make an offer to the company stating the amount they are willing to pay, and then if no sale takes place within two months, it shall be lawful for the commissioners to purchase the undertaking according to, and in the manner provided by, the Lands Clauses Consolidation Act of 1845. The Bill gives power to erect new works on a site described, and to carry on all the manufactures appertaining to the supply of gas and the utilization of products. It also empowers the commissioners to supply public lights, and stipulates that certain institutions supported by rates may be supplied gratuitously. None of the usual provisions for inspection and punishment of fraud are made, these probably being provided for by the Act of 1853, with which this Act is to be read as one. The gas supplied is to be of 15-candle power, and the price is to be 4s. within the parish of Chorley and 4s. 6d. beyond. Security may be required from intending consumers, and if such security be a deposit of money, interest at the rate of 4 per cent. is to be paid by the commissioners after six months. The common provisions are made for the testing of the gas, the penalty recoverable for deficiency of illuminating power being £20.

The *Forfar Gas Bill* is to authorize the purchase of the undertaking of the Forfar Gaslight Company by the magistrates and Town Council under an agreement already made between the company and Corporation. The Corporation is to pay per-

petual annuities at the rate of 7½ per cent. on the paid-up capital of the company, which amounts to £900. Certificates of the annuities are to be substituted for the shares. The company are to pay all debts and receive all rents up to the 15th of July, 1871; but a mortgage debt of £250 is to be assumed by the Corporation. All the usual powers are conferred on the Corporation. The gas supplied is to have the illuminating power of 18 candles, tested by a 15-hole Argand, with 7-inch chimney. A Local Board or any five consumers may appoint an examiner, who is to have access to a testing-place to be provided by the Corporation, and a fine of £20 may be inflicted for non-compliance with the requirements of the Act. The Corporation may require security from a consumer, and allow a discount of 5 per cent. on charges for gas and products, and articles manufactured or sold by them. It may be specially remarked that this Bill prescribes no limits for the price of gas. Power is sought to borrow £5000 on mortgage of the works and gas-rents, or on cash credit, according to usage in Scotland. The revenue derived is to be applied exclusively to the purposes of the undertaking, the payment of the annuities and the interest on borrowed money, and to the formation of a sinking and contingent fund. The Corporation seek power to levy a gas contingent guarantee assessment, to meet any deficiency in the annual expenditure under the provision of the Bill. Annuitants wishing to dispose of the annuities are bound to offer to sell them to the Corporation at 22½ years purchase, and the Corporation may decline to register any transfer if such offer be not made.

The *Greenock Police Improvement and Gas Bill* is to authorize the Board of Police to make a complete purchase of the gas undertaking in that town from the Corporation, who are, or claim to be, owners of the works, buildings, and site thereof, although the supply is under the management of the Board, the latter being, with the Corporation, jointly interested in and liable to the profit and loss of the undertaking by virtue of complicated arrangements made under an agreement and Acts of Parliament which need not be mentioned or described. The consideration to be paid by the Board to the Corporation for the works, lands, and property is the sum of £34,016 17s. 5d.; and in consideration of the waiver by the Corporation to share equally with the Board in future profits of the undertaking the sum of £40,000. This money is to be applied by the Corporation to the general purposes of the Corporation. The transfer is to take place on August 1, 1871. All contracts, &c., in favour of the Corporation are to be made available to the Board, who are to assume all the debts and liabilities of the Corporation in respect of the gas undertaking. The Bill is to give the Board all the rights usually exercised by Gas Companies, with the customary obligations; and also power to take certain lands for the erection of new works. The limits for the supply of gas are the parish of Greenock; but the Board seek power to supply persons and Corporations beyond those limits, provided such supply can be given without unduly lessening the supply to consumers within the limits. Gas is to be supplied having the illuminating power of 25 candles when tested by a union jet burner consuming 5 feet per hour under the pressure of 5/10ths of an inch of water. Any five consumers may appoint an examiner, who is to have access to a testing-place to be provided by the Board, and on proved deficiency of illuminating power a penalty of £20 may be recovered. The price of gas is not to exceed 5s. per 1000 feet. For the purposes of the Bill power is sought to borrow £130,000 on mortgage, or on cash credit. This debt, on agreement with bondholders or mortgagees, may be funded. Five years after the new works are in operation, 1 per cent. on the borrowed money is to be set apart for a sinking-fund to redeem the mortgages. Power is sought to levy a "gas guarantee rate," not to exceed 6d. in the pound, in the event of any deficiency in funds for payment of interest or sinking-fund. The revenue from the undertaking is to be applied first to the purposes of the Bill; but any balance may be carried to the credit of the Board for general purposes.

The *Huddersfield Improvement Bill* contains only two provisions relating to gas matters. One empowers the Corporation to make contracts with the owners of any gas-works, or any other person, for lighting the borough; and the other (section 229) simply authorizes the sale and purchase by the Corporation, on agreement, of any gas undertaking within the borough, the purchase to be made by payment of a gross sum or annuities, the Corporation being limited to the district actually supplied by the company at the time of the purchase. The Corporation seek power to borrow £150,000 on mortgage, or by granting annuities, but no mention is made of any sum to be paid for gas undertakings. It is provided, however, that the borrowed money shall be expended exclusively on works, or objects on which capital may be properly expended, and not in defraying the expenses of maintenance of any works, or other current expenses of or connected with any work or establishment.

The *Kilmarnock Municipal Extension and Improvement Bill*, among other things, authorizes the purchase of the undertaking of the Kilmarnock Gas Company by the Police Commissioners, under an agreement already entered into. The consideration to be paid is £40,000, consisting of £36,000, the paid-up capital of the company, and £4000, the mortgage debt, the interest on which is to be paid by the commissioners after the transfer, which is to be made on the 14th of June next, if the Bill should pass before that date, or the 14th of June, 1872. Until one or the other of these dates the company is to carry on their business as usual, making all necessary improvements and extensions, and when the transfer takes place the stock of the company is to be taken by the Corporation at a valuation, to be made by Mr. G. R. Hislop, of Paisley, or Mr. J. Hislop, of Ayr. If this Bill should not pass before the 14th of June, 1872, the agreement is to be void; and if it should pass, and either party fail to fulfil the obligations, £1000 is to be paid to the other by way of solatium, or compensation. After distributing the purchase-money among the shareholders the company is to be dissolved. All the usual powers are applied for by the Bill; and there is in this, as in the Greenock Bill before mentioned, a provision which will enable the Corporation to compel the satisfactory lighting of common stairs, passages, and private courts. The price of gas is not to exceed 6s. per 1000 feet, and the illuminating power is to be 24 candles, tested by a 15-hole Argand, with 7-inch chimney, or other approved burner and chimney. The Corporation are to provide a testing-place within a year after the transfer, and the sheriff, on application of any five consumers of gas to the aggregate amount of £10 in the year preceding, may, if he thinks fit, by order in writing, of which reasonable notice is to be given to the Corporation, appoint a competent person to examine the gas, who, after the notice has been given, is to have access to the testing-place at any reasonable hour in the daytime; and on proof of deficiency the sheriff may fine the Corporation £5. Power is sought to contract for lighting public roads beyond the limits of the burgh. The Corporation ask power to borrow £50,000 on mortgage or by cash credit, for the purpose of the gas undertaking. After the expiration of ten years the Corporation is to set aside 1 per cent., and after 20 years 1½ per cent. on the borrowed money, to form a sinking-fund exclusively for the redemption of the gas-works mortgages. It is provided that it shall be lawful for the Corporation, by resolution, to convert the mortgages into a funded debt, the holders of which will not be entitled to repayment of capital, but will receive annuities not to exceed 5 per cent. A separate gas account is to be kept, and the revenue is to be applied exclusively to the maintenance and extension of works, to the payment of interest, to the sinking-fund, and the surplus (if any) is to be applied to the reduction of the price of gas for private purposes within the extended burgh. It must be mentioned that the Corporation ask power to levy once every year a "public gas-works rate," which is not to exceed 6d. in the pound, not apparently to cover any deficiency in revenue, but to pay for public lights within the burgh.

The *Newry Borough Improvement and Water Supply Bill* contains a clause (41) empowering the commissioners of that town to purchase by agreement the undertaking, property, and rights of the Newry Gas Company; and when the purchase has been made all rights, powers, and authorities of the company are to be transferred to the commissioners. The terms agreed upon between the commissioners and the company must be approved by a fit person appointed by the Commissioners of Public Works in Ireland. The Bill will give authority to borrow £30,000; but it is not said how much of this sum is to be applicable to the purchase of the gas undertaking.

The *Perth Gas Bill* will give to commissioners, to be incorporated by the Bill, power to make a compulsory purchase of the undertakings of the Perth Gaslight Company and the Perth New Gaslight Company, by agreement, if possible, and, if not, by arbitration. The considerations may be paid either in lump sums or by perpetual annuities. The Bill will give all the ordinary powers and authorities of gas companies to the Corporation. The gas supplied by the commissioners is to have the illuminating power of 25 candles, tested by a union jet burner, consuming 5 feet per hour under 5/10ths pressure. A testing-place is to be provided, and any five consumers of gas or ratepayers may appoint a competent person to make a test; and the sheriff may impose a penalty of £20 for proved deficiency. The price of gas is to be fixed on a yearly estimate; an additional shilling per 1000 feet may be charged to consumers beyond the burgh. A gas contingent guarantee rate (not limited in amount) may be levied to meet deficiency in revenue. General powers are asked to borrow any sum that may be required for the purchase of the gas undertakings and incidental expenses; and £15,000 more, either on mortgage or by cash credits. A sinking-fund and a depreciation of works

fund are to be formed by the commissioners. No other provisions are made as respects the application of the revenue derived from the gas undertakings.

The *Sheffield Improvement Bill* may stand in a class by itself. The Corporation seem for the present to have abandoned the intention to purchase the gas-works; and this Bill will only give them power to make contracts with any company, body, or persons having power to supply gas within the borough for lighting the streets and courts of the borough. A noticeable section in the Bill is one which provides that the costs incurred with respect to the promotion of the three gas and water bills introduced last session may be paid by the Corporation out of the borough fund.

GAS LITERATURE IN GERMANY.

We have received regularly, for some years, copies of a *Journal of Gas Lighting and Water Supply*, published monthly at Munich.* We take credit for having been the first to establish, as early as the year 1849, a periodical expressly devoted to these subjects, and it is gratifying to see those interested in gas matters in other countries following our example. The journal we have mentioned appears to be the acknowledged organ of gas and water interests in Germany; it has been thirteen years in existence, and has, we believe, a large circulation. It is ably edited by Dr. N. H. Schilling, the director of the gas-works at Munich, and author of an excellent Treatise on Gas Lighting, published in 1860; and it is through the courtesy of this gentleman that we are furnished with the numbers as they appear.

The German journal contains original articles, descriptions of constructed works, notices of passing events, translations from our own and other journals, &c.; and one important feature in it is that it is the recognized organ of the German Association of Gas Engineers and Gas Managers, giving full reports of their annual meetings, and copies of the most important papers then brought forward.

It may afford our readers some idea of what is written about gas matters abroad, if we give a brief notice of its chief contents during the past year.

The January and February numbers contain lengthy original articles on the lighting of theatres and other large rooms, illustrated by elaborate descriptions of the most modern arrangements at the Court Theatre in Munich, La Scala in Milan, the great theatres in Paris, &c. This is a branch of gas practice which, considering its magnitude, has received far too little attention, the arrangements often being both ineffective and wasteful. The examples here given of care and science in the continental plans are worthy of study and imitation.

The January number also contains an official report on a curious gas question—namely, the effect of leakage from gas-mains in injuring the roots of trees. It appears that, in some of the ornamental parts of the city of Aix-la-Chapelle, the trees had languished and died away; and as, on opening the ground, gas exhalations were perceived, the damage was laid to the charge of the gas company, against whom proceedings were commenced by the city. A commission of experts was appointed to investigate the question, and, after a long inquiry, both theoretical and experimental, they came to the conclusion that the damage was due, not to the gas, but to the unfavourable nature of the ground—the Macadam paving preventing the access of air and water to the roots. They found, moreover, that pure coal gas was harmless to vegetation, but that it might contain certain forms of hydrocarbon of a noxious kind.

In the May and December numbers are notices of some important investigations by Dr. Richters, "On the Changes induced "in Coal by Exposure to the Air."

In May and August are given some papers on Photometry; these are continuations of former ones, and as the subject is an important one just now, we may perhaps return to the series on a future occasion.

In the July and August numbers is a long report by M. Simon Schiele, of Frankfort, on two modes of light production, which have lately excited much attention abroad—namely, that of M. Tessié du Motay, of Paris, for burning rich gas in conjunction with a stream of oxygen; and that of M. Phillips, of Cologne, for the application of oxygen gas to the combustion of a peculiar hydrocarbon liquid prepared by himself, and called "Carboline." The report points to great advantages obtainable by these processes in cases where a powerful light is required to be concentrated in a single spot, as in lighthouses, the illumination of large public rooms and spaces, and so on; but we must refer to the journal itself for further particulars.

In the July number are given some useful practical hints on the management of gas-works, by M. Feriedrich, of Darmstadt; and in the August one is printed a report to the Association on the establishment of experimental gas-works, for the determination of difficult questions requiring investigation. It has been proposed to erect such an establishment at the cost and for the benefit of the members of the Association in general; and although the plan has not yet been practically carried out, it has been thought desirable to settle, with some precision, the necessary arrangements.

The subject of gas-burners has received attention. In the April number is a notice of Mr. Kirkham's investigations; in the November one is an interesting original letter by Mr. Sugg; and the December journal gives a translation of the papers lately communicated to us by Mr. Pole.

In the matter of Water-Works the volume is rich in information. The Gas Association, at their meeting at Coburg, in 1869, resolved to collect data as to the supply of water to large towns in Germany; many of these have been already published, and more are in course of preparation. The present volume contains copious particulars of the supply of Halle, Altenburg, Kiel, Brunswick, Hamburg, Altona, Vienna, Essen, Nordhausen, Berne, Paris, Lubeck, Wurzburg, and Cassel, with short notices of the modes of supply in a great number of other continental towns. There are also lengthy papers on water supply in general, and on the relation it bears to the drainage of land.

The July number has a long investigation of the laws governing the supply of water from porous strata, as exemplified in springs, wells, artesian bore-holes, and the action of filter-beds. We recollect that this subject was ably treated in a practical way by the late Robert Stephenson, in his report on the supply of Liverpool from the red sandstone strata under the town; and the question has lately acquired additional interest as regards the water-bearing strata of the London basin, which have been so prominently mentioned in the late report of the Royal Commission on Water Supply.

In the October number is an essay by M. Grahn, on what he calls *hydrotimetry—i. e.*, the determination of the quality of water used for town supplies. He points out that the ordinary modes of chemical analysis are long and difficult, and that, in consideration of the frequent changes which take place in the sources, methods of determination are required which are more easily and more promptly applicable; he proposes, indeed, for water supply, something analogous to the regular periodical testings applied to gas illumination, and he gives his idea as to how this may be done.

We have said enough to show the value of the matter in Dr. Schilling's periodical; such of our readers as take interest in the subjects quoted, and can read German, will be well repaid for a reference to the volumes of the journal itself, which may be found, we believe, in the library of the Institution of Civil Engineers. We hope in future, if our space will permit, to insert notices of any important papers it may contain, soon after we receive them.

* Journal für Gasbeleuchtung und verwandte Beleuchtungsarten; mit einem Anhang uber Wasserversorgung. Organ des Vereins von Gasfachmännern Deutschlands, und seiner Zweigvereine, so wie des Vereins für Mineralöl Industrie. Monatschrift; von Dr. N. H. Schilling, Director des Gasbeleuchtungs-Gesellschaft in München. Müuchen, Oldenbourg.

Circular to Gas Companies.

There is but little which calls for comment in the gas Bills to be presented to Parliament in the coming session, abstracts of which will be found in another place. Necessarily these measures year by year assume, in most respects, a stereotyped character. The same powers for the manufacture and supply of gas, and in general for the utilization of products, are taken both by companies and Corporations, as well as the right to make and deal in meters and all pipes and fittings required in the use of gas. Like powers are taken for the punishment of fraud, and the recovery of rents; and the differences in the Bills are chiefly in the amounts of capital asked for, varying, of course, with the size of the undertakings, and the price to be charged for gas, which must fluctuate according to the locality of the undertakings.

One Bill, which requires especial notice, is that of the Chartered Gaslight and Coke Company, which proposes to make some important changes in the City of London Gas Act, 1868. The first thing to be observed is that the Bill will make the gas referees a permanent charge on the gas companies, whereas the Act of 1868 obviously intended that the appointments should be only temporary, and for the purpose of laying down certain limits and instructions. Another grave alteration is the proposal that a *weekly* in place of *daily* mean shall be taken to represent the illuminating power of the gas, and that proceedings shall only be taken when that weekly mean is below the prescribed power. A like provision is made with respect to impurities; but in this case, probably by oversight, it is not proposed to take the mean of the six experiments, but it is simply said that "if in any week the amount of impurity in any "form has exceeded the maximum allowed," a forfeit will be incurred. Now, a weekly mean for the amount of impurities is a very reasonable proposal, having in view the utter impossibility

of keeping them completely within a fixed limit, unless a high maximum be decided upon. As regards illuminating power, it will be difficult for the company to make out as strong a case, and it remains to be seen how the Legislature will deal with the proposal named. The clear effect of the enactment will be that only one fine a week can be recovered from the company for either offence, whereas under the Act of 1868 they might be fined every day. The Bill will also reduce the amount of forfeiture recoverable, limiting it to a maximum amount, and directing it to be assessed simply according to the quantity of gas made in the week, without any reference to the alleged deficiency in candle power.

The range of maximum price in the Bills is somewhat remarkable, since it varies from 3s. per 1000 feet for 15-candle gas at Burnley, in Lancashire, to 7s. per 1000 feet for 12-candle gas at Potter's Bar, Middlesex. In connexion with this latter case, we may mention that there are three applications for power to supply gas within conterminate limits. One set of promoters offer to supply 14-candle gas, free from ammonia and sulphuretted hydrogen, for 4s. 6d., another set propose to supply gas of the same quality for 6s., while the third proposal, named above, is to supply 12-candle gas for 7s. per 1000 feet; to which, in the last case, is added the utterly preposterous provision that 24 hours notice shall be given of the intention to test the quality of the gas.

It will be seen that, with a single exception, both companies and Corporations offer a guarantee to consumers for the quality of the gas, by providing that a testing-place shall be maintained to which any examiner appointed is to have access at any reasonable hour in the daytime, previous notice being required but in two instances. In general the old 15-hole Argand is adhered to as the standard burner, the words or "other approved burner" being added in one or two cases. Some difference of opinion appears to exist as to the best burners to be employed, for in one instance we see that a 15-hole Argand, with 7-inch chimney, is to be used in testing 30-candle gas; and in another, that 14-candle gas is to be tested with a fishtail. The new "London" burner is fixed upon in two Bills. The maximum penalty to be imposed for deficiency of illuminating power is in almost every instance £20; but the Kilmarnock Corporation ask to be let off with a maximum forfeit of £5. As a rule, borrowing power is sought to the extent of only one-fourth or one-third the amount of the capital; but in one instance powers are asked which might make the sums borrowed amount to nearly one-half the capital. The Corporations seeking power to purchase gas undertakings offer, on the whole, very liberal terms to the proprietors, and only one or two of these Bills are likely to encounter opposition. The Sheffield Corporation seem for the present to have relinquished their desire to get possession of the gas undertakings, for although notice was given of a Bill to empower them to make the purchase, it has not been deposited, and the Sheffield Improvement Bill only empowers the Corporation to make contracts for the supply of public lights. A significant clause is put at the end of the Bill, which will make it lawful to pay the cost of last year's proceedings out of the borough fund.

In pursuance of the Act of last session, the Local Board of Rotherham paid on the 5th inst. £56,400, the sum agreed upon, for the purchase of the undertaking of the Rotherham Gaslight and Coke Company, with £30 18s. 1d. interest, at the rate of 5 per cent. for five days, the purchase-money not having been paid on Jan. 1 as agreed upon. A report, which we publish in another place, shows that the transfer has not been made without some exhibition of ill feeling on the part of the Board, who express themselves dissatisfied with the conduct of the directors of the gas company. No doubt the differences between the company and the Board will soon be honourably settled.

The usual winter complaints as to the quality of gas have been louder and more unfounded in Glasgow than we have heard of in any large city, and some correspondence has been published in the newspapers of that city which shows the little knowledge possessed by the general public on gas matters. It seems probable that there may have been a little deficiency in the supply in one or two districts, the present works being scarcely equal to afford a full supply during the period of greatest consumption. But beyond all doubt the chief cause of the complaint is the fact that the public continue to use the burners fixed when the pressure was much higher, now that the trunk mains have been enlarged, and the initial pressure is much reduced. The report of Dr. Wallace, the official examiner, which we print elsewhere, shows that the quality of the gas is considerably in excess of the requirements of the Glasgow Act.

The city of Aberdeen is just now much exercised on gas affairs. Our notice of the Bills for 1871 will show that a contest is impending between the gas company and Corporation of that city. The Corporation have made a proposal to the company which their Bill, if passed, will enable them to carry out; but in the meantime we observe that complete unanimity does not exist in the council as to the propriety of the measure. It is difficult to combat such views as those held by Mr. Barclay, who contends that the Corporation should only take the works at the price for which new ones could be erected; but we must suppose that if he himself had a business to dispose of, he would, however profitable the business might be, sell the stock and fixtures at a valuation, and ask nothing by way of premium. It seems to be the opinion of some members of the council, that Parliament will give them power to erect new works to compete with the existing company, and that it would be better to try this than pay the offered annuities. In this they are tolerably certain to find themselves mistaken. The Bill promoted by the gas company is a fair and even liberal measure, and if the council are not disposed to proceed with their purchase, they may as well save the money they would expend in opposition, and stay at home, for it is not at all likely that the Legislature would sanction a competing scheme of the kind contemplated.

The mining town of Aberdare, in Glamorganshire, has been for a few months past enjoying the questionable benefit of a fierce competition in gas. It will be in the recollection of our readers that, in 1869, a local consumers company came to Parliament and obtained power to break open the streets, notwithstanding the opposition of a non-parliamentary company who have supplied the town for many years. This latter company applied for an Act last year, and failed to obtain it. They refused to sell their undertaking, as they might have done, on good terms, and the new company have consequently erected works, and are supplying such of the consumers as choose to deal with them at 4s. per 1000 feet, while the old company charge 3s. 4d., and, of course, retain a portion of the trade. The war must apparently go on till one of the parties succumb, or until both are tired of fighting and can agree to amalgamate. The old company are about to make another effort to obtain statutory powers, and the result of this application will probably determine their fate.

Correspondence.

GAS-FLAME DENUDED OF ITS IMPURITIES.

SIR,—Having, for a great many years, held strongly the opinion that there *must* be something in chemistry, even though at present unknown, which, by proper application, should be capable of "denuding gas"—that splendid discovery of modern science—"of its impurities," I collected the best books on chemistry, and sought to discover the exact properties of gas-flame. I then studied further, and found that almost all the constituent parts of gas-flame had the strongest and most marked affinity for "*pure water*." I looked further, and found that no other known ingredient had, in itself, such effect on these constituents as this simple and natural element.

I therefore sought to bring pure water, or the steam of pure water, to bear upon a gas-flame as the latter issued, in the burner, into life. I employed various mechanics to make the machines I drew for them; I have, at last, discovered the best mode of doing so, and have had this exceedingly cheap apparatus fitted up in every part of this house, which consists of four sitting-rooms and twelve bed-rooms.

The water, or exhalation from water, entirely denudes the gas-flame of the noxious acids and gases of which it is composed, and enables it to come out in a heat which all scientific and other persons who have seen it and felt it here, have pronounced to be "pure, wholesome, and delightful to inhale."

I have taken out no patent for it, not being in want of such adventitious aid; but I freely give it to the public, the first means thereto being a letter to be inserted in the JOURNAL OF GAS LIGHTING. I have also tried the action of gas-heat upon various metals, and I will merely add, that no one should ever cause gas-heat to be evolved through, or to come into contact with, iron or other metal, but through fire-brick or porcelain tubes; that they should do "justice to gas," as they do to coal, by giving it a vent of some sort. No one ever sat in comfort by a coal fire in a room without the natural vent which we call a chimney, and no one should ever seek to heat their rooms with the heat of gas, however sweet and delicious it may be, without giving it a vent—such vent as may naturally suggest itself.

The quality of heat here produced is, by test and ventilation, as pure as that evolved from coal, without smell or effluvia, and is exceedingly agreeable to inhale. In the case of bed-rooms, all those who are in health and those who are delicate, sleep in perfect comfort. The price of obtaining this heat from gas—whether the gas or the apparatus—as compared by experiment with coal, is considerably lower.

One of the first philosophical chemists in London, closely connected with the Royal Institution, after a description was given to him, wrote me to the following effect:—"I think you have certainly discovered the means for effecting this object, and on strictly scientific principles." Another equally distinguished person said—"The well-known principle you have taken for your guide has never yet been applied as you have applied it."

All works worthy of imitation are marked by simplicity or by nature; mine, by "*pure water*."

I have now done. I open my house, heated in every part by gas, to every scientific or other person who may wish to see "gas-flame denuded of its impurities" in full play, any day from two till

four o'clock. I had rather not make drawings; I leave that to others. It is always difficult to make practical mechanics sufficiently clear by written representations or illustrations. Any one who comes may make them for themselves.

I need hardly add that I have not the most remote interest or benefit in thus making the above known, excepting the inward gratification of giving to others and to the public the same knowledge, for practical good, which I have, after much labour and expense, worked out for myself. E. WARD-JACKSON.

Royal Park, Clifton, Bristol, Jan. 11, 1871.

Legal Intelligence.

COURT OF EXCHEQUER.—WEDNESDAY, JAN. 11.

(*Sittings in Banco, before the* LORD CHIEF BARON, *and Barons* MARTIN, PIGOTT, *and* CLEASBY.)

KREHL AND OTHERS, ASSIGNEES, *v.* THE GREAT CENTRAL GAS COMPANY.

In this case a rule had been obtained to set aside an order of Baron Martin, made on the 12th of July last, under the provisions of the Common Law Procedure Act, 1854, referring the matter in dispute between the parties to the Master, and it now came on for argument.

Mr. DIGBY SEYMOUR, Q.C., and Mr. DAY showed cause on the part of the plaintiffs; and Sir JOHN KARSLAKE, Q.C., and Mr. WATKIN WILLIAMS appeared to support the rule.

The plaintiffs were the assignees of the notorious Benjamin Higgs, who defrauded the Great Central Gas Company of about £70,000, and fled this country to avoid punishment. Higgs had effected a policy with a guarantee society for £250, and it contained a clause giving the society, in the event of any defalcations on his part, a right to seize and realize his property. When his conduct became known, the guarantee society took possession of Tide End House, on the Thames, where Higgs had lived in grand style, and under a private arrangement, by which the gas company undertook to be liable for all the consequences, they continued possession, and ultimately had the whole of the contents sold by auction. Higgs having been made a bankrupt, the plaintiffs, as his assignees, brought this action for the wrongful conversion of the property, and the defendants paid £2050 into court. When the case came on for trial before Baron Martin, in London, he refused to try it, on the ground that the questions in dispute were merely matters of account, and made the order, referring it to the Master, under the 3rd section of the 17 & 18 Vict., c. 125. It was now sought to set aside the order on the ground that the case involved other points beyond questions of account, which could only be decided by a jury and the court. Some of the goods, it was said, were not dealt with by the defendants, and the legality of the adjudication of Higgs as a bankrupt, under which the plaintiffs acted, was disputed.

Ultimately the case was ordered to stand over, with a view to the parties endeavouring to come to an arrangement to refer the matter to a lawyer, who should have power to call an auctioneer to his assistance if necessary.

WESTMINSTER POLICE COURT.—WEDNESDAY, JAN. 11.

(*Before Mr.* WOOLRYCH.)

Frederick Dashwood, in the attire of a lieutenant in the navy, was charged with wilfully damaging a street-lamp glass, valued 1s. 6d., the property of Mr. Z. D. Berry, a contractor.

Henry Watts, 361 B, said at four in the morning he was on duty in Cheyne Walk, Chelsea, and saw defendant, who was drunk, with two "gentlemen." After they had passed him the defendant climed up a lamp-post, and deliberately breaking the glass with his fist, slid down and ran away, but was speedily captured. He then alleged as an excuse that he had done it for a wager.

Mr. *Zephaniah Deacon Berry*, contractor for street-lamps, said the loss fell on him. Last week 400 panes were broken, and during three days this week 300 of his lamps had been smashed.

The defence was that the defendant had only been on shore a few days, and this was a drunken freak, which would be a warning to him.

Mr. WOOLRYCH inflicted a penalty of £4, and costs of the damage.

The fine was paid.

Miscellaneous News.

TRANSFER OF THE ROTHERHAM GAS-WORKS TO THE LOCAL BOARD.

A Special Meeting of this Board of Health, under the presidency of Mr. HABERSHON, was held on Tuesday, Jan. 10, at the Offices in Howard Street.

The minutes of the meeting held on the 5th of January were taken, from which it appeared that on the motion of Mr. Mycock, seconded by Mr. Bibbs, the following resolutions were carried unanimously:—

That the seal of the board be affixed to a deed poll already engrossed and intended to be dated the 5th of January, 1871, under the corporate seals of this board and of the governor and company of the Bank of England, being a mortgage for securing the sum of £10,000 to be advanced by the governor and the company to this board for water-works purposes, with interest thereon, and that the said sum of £10,000 be paid to John Gibbs, of Rotherham, in the county of York, gentleman, the treasurer of this board.

That the seal of this board be affixed to the deed poll already engrossed and intended to be dated the 5th day of January, 1871, under the corporate seals of this board, and of the governor and company of the Bank of England, being a mortgage for securing the sum of £55,000 to be advanced by the said company and governor to this board for gas purposes, with interest thereon, and that the said sum of £55,000 be paid to John Gibbs, of Rotherham, in the county of York, gentleman, the treasurer of this board, and forthwith paid over to the Rotherham Gaslight and Coke Company, as part of the purchase-money for their undertaking and works.

The board subsequently adjourned to the offices of the gas company, where they met Mr. G. Haywood and Mr. J. Kerr, directors; Mr. Barras, secretary; and Mr. Wake, the company's solicitor, when it was resolved—

That the board accept the proposal made by Mr. Wake, on behalf of the gas company, that the transfer of the undertaking from the company to the local board shall be settled by Mr. Waley on behalf of the local board, and by Mr. C. Chapman Barber on behalf of the gas company; and, in case of their disagreement, the same shall be settled by Mr. Chas. Davidson, conveyancer, Mr. Wake giving his undertaking as the solicitor that the transfer, as settled, shall be duly executed by the company, within one month from the date hereof.

Mr. Wake then gave the following undertaking as the attorney for and on behalf of the Rotherham Gaslight and Coke Company, in consideration of the purchase-money for the gas undertaking being this day paid by the Rotherham and Kimberworth Local Board:—

I do hereby undertake as such attorney, as aforesaid, that the said company shall duly execute the transfer of their undertaking to the local board, within one month from the present date hereof, such transfer to be settled by Mr. J. Waley on behalf of the board, and by Mr. C. C. Barber on behalf of the company; and, in case of any disagreement between them, the said transfer to be settled by Mr. C. Davidson, the conveyancer.—Dated this 5th day of January, 1871. W. WAKE.

The sum of £56,400, with £30 18s. 1d. for interest thereon, was then paid to the two directors present, and possession given to the local board.

Mr. WHITFIELD (clerk to the board) proceeded to explain that it was enacted by the Act of Parliament obtained last session by the board that the purchase-money of the gas undertaking should be paid on the 1st of January, in the present year, at the gas company's offices, or on such other date and at such other place as should be agreed upon by the board and the gas company, and if the purchase-money were not paid on the above-named date, the gas company would be entitled to interest thereon at the rate of 5 per cent. per annum. The money could not, however, be paid on the 1st of January, that day being Sunday; and he communicated with the gas company, asking if the 4th of January would be a convenient day on which the purchase could be made. He received no reply, and as the interest the board were to pay amounted to about £50 per week, it became a serious matter. He wrote a second time, informing the company that the board would be prepared to settle with them on the 5th of January. As the minutes showed, the money was paid, and possession of the gas-works was given to the board. More than £30 had been paid for interest on the purchase-money for those five days. The transfer had been settled by very eminent counsel, and had been drawn up in such a way as to secure all that was necessary for the protection of the board, and to give them those powers over the gas company which they ought to possess in the event that the company did not act in accordance with the Act of Parliament. Mr. Whitfield further stated that at the time the money was paid to the company, he was given to understand that all the debts incurred by the transfer had been paid, and everything handed over, but on the following day he received a letter from Mr. Wake, stating that the company had overlooked a sum of £60 or £70 which they had in hand. The letter contained a cheque from Mr. Barras for £32 5s. 10d., and said that the company had discovered that they had in hand in respect of petty cash £76 7s., out of which there was paid for small disbursements 16s. 6d., and for their law bill, £43 4s. 8d., leaving a balance which the enclosed cheque would cover. The cause of the above-named sum having been overlooked arose from the short notice which the board had given of their intention to complete the purchase. There had not been time to make a copy of the bill of £43 4s. 8d. which had been paid, but particulars would be forwarded to him (Mr. Whitfield) in a day or two. The cheque had been declined by him, and sent back. Mr. Whitfield explained that the whole of the company's undertaking became vested in the board as from the first day of January, 1870, subject to certain payments which he enumerated. These payments had been carefully met by the board.

Mr. MOOREHOUSE was of opinion that the money should have been paid into the bank immediately at the time arriving when the transfer could be made, instead of being paid for interest to the company.

Mr. WHITFIELD replied that if it had been paid into the bank it must have been deposited in the names of the two parties, and one could not remove it without the other. Not only this, there would have been the interest going on at the rate of about £50 per week. Mr. Whitfield then spoke on the subject of the taxation of costs. He had given notice to the company that Friday next was the day appointed for taxing the whole of the costs connected with the parliamentary proceedings of the gas company, both in promoting their own bill and in opposing that of the local board. Mr. Wake, in reply, had stated that the company did not ask for any taxation at all. He also stated that he understood Mr. Whitfield to contend that the bills paid by the directors with reference to parliamentary expenses were open to revision by reason of a memorandum signed by the chairman of the local board and the chairman of the gas company in May last. If such bills could be dealt with by such memorandum, Mr. Grubb and Mr. Norton were the tribunal, and only in the even of disagreement between those gentlemen could anything dealt with under the memorandum go to the taxing-master. Mr. Whitfield thought the costs would have to go before the taxing-master, as there was no probability of Messrs. Grubb and Norton agreeing. The board were entitled to considerable reductions, far more than the £500 they had agreed to accept. He (Mr. Whitfield) expressed the surprise he felt on receiving Mr. Wake's letter, in which he denied that the company had agreed to have the expenses taxed. The memorandum which had been referred to was signed by himself, as the board's solicitor; by Mr. Hoyle, solicitor on behalf of the gas company; by the chairman of the Local Board of Health; and by the secretary to the gas company; and it set forth that the whole of the parliamentary expenses should be referred to Messrs. Grubb and Norton, and, failing agreement between them, to the taxing-master in the usual way. Mr. Whitfield then read his reply to Mr. Wake's letter, which was as follows:—

Dear Sir,—The conduct of the gas company throughout this long and tedious business has indeed been extraordinary, but this last attempt to repudiate their agreement, to subject the whole of their parliamentary expenses to taxation, if not settled by Messrs. Grubb and Norton, is, to say the least of it, the most flagrant breach of honour and good faith that man could be guilty of; but I think they will find that they cannot escape from the engagement deliberately and advisedly entered upon.

Mr. Whitfield then stated that the witnesses who had given evidence on behalf of the gas company had charged five guineas a day for their attendance in London, when most of them were only entitled to one guinea, and none to more than two. He then read a claim made by Mr. Tomlinson:—

Rotherham Gas Company, to Charles Tomlinson, debtor. For eighteen days charges in session of 1870—March 12, 14, 15, 19, 22, 28, 29, 30, 31, and April 1 to 9, inclusive—during the whole of which time evidence carefully perused, consultations attended, Acts of Parliament considered, &c., &c., &c., £94 10s.; hotel and other expenses, being one-half usual charge, as company paid part expenses, 18 guineas: total, £113 8s.

Speaking of Mr. Wake's bill, Mr. Whitfield was of opinion that the board were not bound to pay one farthing. Mr. Wake was all the time acting as Mr. Barras's solicitor. In a letter which Mr. Whitfield had received from Mr. Wake, the latter gentleman stated that he was not acting for the gas company, but for Mr. Barras.

The board then went into committee.

METROPOLIS GAS SUPPLY.

Dr. Letheby, the chief gas examiner appointed by the Board of Trade, has recently submitted to the corporation and the Metropolitan Board of Works a report of the quality of the gas supplied to London by several of the gas companies during the last three months, and the following are the tabular results:—

I.—WITH REGARD TO ILLUMINATING POWER.

Illuminating Power in Standard Sperm Candles.

	Max.	Min.	Average.
Common Gas—			
City of London Gas Company	18·4	16·2	17·20
Chartered Gas Company (Leadenhall Street)	19·2	16·5	17·57
Chartered Gas Company (Gray's Inn Road)	17·5	15·5	16·50
Chartered Gas Company (Arundel Street)	18·7	16·4	17·37
Great Central Gas Company	19·3	16·6	18·02
Imperial Gas Company (Camden Street)	17·1	14·1	15·49
Imperial Gas Company (Oakley Square)	17·8	15·2	16·50
South Metropolitan Gas Company	18·5	14·2	16·14
Cannel Gas—			
City of London Gas Company	30·8	24·3	26·96
Chartered Gas Company	26·6	23·1	25·55

From which it appears that the average illuminating power of the common gas supplied by the several companies has ranged from 15·49 candles, in the case of the Imperial gas, at the Camden Street testing-place, to 18·02 in that of the Great Central Gas, and the cannel gas has been from 25·5 to 26·9 candles.

II.—WITH RESPECT TO PURITY.

The gas of all the companies has been constantly free from sulphuretted hydrogen, but the amount of sulphur in other form has fluctuated to a large extent, as will be seen from the following table:—

Grains of Sulphur per 100 *Cubic Feet.*

	Max.		Min.		Average.
Common Gas—					
City of London Gas Company	30·3	..	17·8	..	23·54
Chartered Gas Company { Leadenhall Street	34·3	..	19·5	..	27·25
Chartered Gas Company { Gray's Inn Road	36·9	..	21·9	..	33·17
Chartered Gas Company { Arundel Street	33·8	..	22·7	..	28·02
Great Central Gas Company	31·1	..	11·1	..	19·78
Imperial Gas Company { Camden Street	31·8	..	23·4	..	27·91
Imperial Gas Company { Oakley Square	38·4	..	27·0	..	32·37
South Metropolitan Gas Company	39·3	..	27·6	..	32·31
Cannel Gas—					
City of London Gas Company	22·4	..	4·8	..	12·27
Chartered Gas Company	27·9	..	19·7	..	24·39

So that in the case of the common gas the average proportion of sulphur has been from 19·78 grains per 100 cubic feet in the Great Central Gas, to 33·17 grains in that of the Chartered Gas at Arundel Street; and the cannel gas has ranged from 12·27 grains per 100 cubic feet of the City Company's gas, to 24·39 in the Chartered. Ammonia has rarely been present in excessive quantity, but it exceeded 5 grains per 100 cubic feet on five occasions in the Imperial Company's gas at the testing-place at Oakley Square, Chelsea, and on one occasion in the Chartered gas at Arundel Street. Both of these were subjects of appeal to Dr. Letheby, who decided, after full inquiry into the matter, that the excess arose from accidental circumstances.

REPORT OF THE GAS EXAMINER, CITY OF LONDON, RELATIVE TO THE QUANTITIES OF SULPHUR CONTAINED IN THE GAS SUPPLIED TO THE CITY.

To the Gas Committee of the Corporation of London.

Gentlemen,—At the end of 1869 I called your attention to the fact of the great increase in the amount of sulphur contained in the gas supplied to the City, more especially in that of the Chartered Company. I now beg to hand you a table, showing the average amount of sulphur contained in the gas of each company for each month of the present year. From this you will see that not only has the high average of the Charterted Company been maintained, and, indeed, somewhat increased, but that during the last five months the gas supplied from the works of the Great Central Company (which since the introduction of lime purification in 1868 has been remarkable for its freedom from sulphur) has contained a very much larger amount of that impurity. In July last the referees new sulphur test was introduced, so that the actual experimental results obtained during the last five months are not comparable with those of the preceding period, but having ascertained by careful experiment that, as carried out in our testing-stations, the new test gives as nearly as possible 15 per cent. more sulphur than the old, I have added a column in which the experimental results are reduced to the old standard, that a comparison may be made. The result is, that while in 1868 the sulphur in the Great Central gas averaged 14 grains, in 1869 12·5 grains, and in the first six months of 1870 12·8 grains, in the last five months it has averaged (when corrected to the old standard) 18 grains. It is true that the amount of sulphur in this gas has fluctuated more than in that of other companies, but till the middle of this year it has been a fluctuation at a low level—it is now a fluctuation at a much higher one. No reason existing for any alteration in a method of purification, which had for two years and a half proved so successful, this great increase of impurity is a point to which I would desire to direct your particular attention.

I remain, gentlemen, your obedient servant,

CHAS. HEISCH.

City Gas Examiner's Office, 8, Savage Gardens, Nov. 30, 1870.

Average Amount of Sulphur contained in the Gas supplied to the City of London, during each Month of the present Year.

	City Company.		Chartered, Leadenhall Street.		Chartered, Gray's Inn Road.		Gt. Central.	
January	19·8		21·1		23·5		15·9	
February	15·6		22·5		23·9		14·9	
March	21·3		23·7		25·7		11·1	
April	18·8		22·8		26·5		12·1	
May	20·6		23·2		26·0		9·2	
June	19·5		20·5		25·2		14·0	
Average for six months	19·7		22·9		25·1		12·8	
		Corrected to Old Stndrd.		Corrected to Old Stndrd.		Corrected to Old Stndrd.		Corrected to Old Stndrd.
July	21·4	18·6	20·6	17·9	27·7	24·0	19·2	16·7
August	20·5	17·8	23·5	20·4	28·2	24·5	22·9	19·9
September	23·6	20·5	24·4	21·2	27·8	24·1	20·7	18·0
October	20·4	17·7	25·0	21·7	30·6	26·6	21·5	18·7
November	25·8	22·4	27·6	24·0	32·6	28·3	19·4	16·7
Average for five months	22·3	19·4	24·2	21·0	29·3	25·5	20·7	18·0

ON THE PROBABLE ORIGIN OF ALBERTITE AND ALLIED MINERALS.

By S. F. PECKHAM.

[From the *American Journal of Science and Arts.*]

In a paper read at the meeting of the National Academy of Science last August,* I expressed the opinion that solid bitumens occurring in veins of large extent, of which the Albertite is an example, had not been formed by the inspissation of petroleum, but were the product of a very gradual distillation of bituminous minerals at a minimum temperature resulting from their metamorphosis. In the same paper I showed that petroleums containing paraffin and very little nitrogen, like those of Pennsylvania, were not rendered more dense by oxidation, but by inspissation.

In 1863, Mr. J. P. Lesley expressed the opinion in reference to Grahamite, that, "there seems to be no escape from the conclusion, that the substance filling the vertical vein is a product of the gradual oxidation of coal oil once filling the open fissure;" and, further, that "it is not impossible that the lower regions of the fissure are still filled with liquid oil."†

In 1865, in a report made upon Grahamite, Professor Henry Wurtz states that the general aspect of the mass, as well as all the results of a minute examination of the accompanying phenomena, lead irresistibly to the conclusion that we have here a fissure filled by an exudation, in a pasty condition, of a resinoid substance derived from, or formed by some metamorphosis of unknown fossil matter, contained in deep-seated strata intersected by the fissure or dike.‡

In 1865, Professor Charles H. Hitchcock, State Geologist of Maine, said, "The Albert coal" (Albertite) "was originally in a liquid state, was injected into vertical fissures, and subsequently hardened into a substance resembling jet."§

The same year Professor Hind, of New Brunswick, endeavours to show that Albertite is an inspissated or hardened petroleum.*

In 1868, Professor Wurtz says: "No doubt can now be held that the Abertite vein was formed by the injection of a fluid or pasty mass of matter into a fissure or crack in the rocks—that is, in the same way that a dike of volcanic trap or lava is formed."†

In the recent edition of his "System of Mineralogy," 1868, Professor Dana says, "Grahamite occurs in West Virginia . . . filling a fissure (shrinkage fissure) . . . and supposed to be like the Albertite, an oxygenated petroleum."

At the time I ventured the opinion that Albertite was not an inspissated petroleum, I had not seen Professor Wurtz's papers. His views, however, do not appear to be endorsed by Professor Dana, who refers to these papers, and then states the opinion held by a majority of observers—viz., that the minerals are inspissated or oxygenated petroleums. I propose to examine the testimony of those who have written upon this subject, and note some of the difficulties which appear in the acceptance of such a theory.

It appears to me that all true veins of bitumen occurring in the older strata of West Virginia, New York, Canada, and New Brunswick may be referred to a common origin. The asphaltum veins of Cuba may or may not be more nearly allied to a hitherto undescribed vein, occurring upon the coast of Southern California, of which I shall speak hereafter. To this also, without doubt, are more nearly allied certain veins said to occur in Miocene sandstones near the junction of the White and Green Rivers, Colorado. ‡

All observers agree that the veins first mentioned are true cutting veins, at, or nearly at, right angles to the planes of the strata which they intersect. In most instances the enclosing rocks present evidences of metamorphosis, in others they are unaltered, and in others still the metamorposis has obliterated the planes of stratification, the rocks becoming crystalline. It is further their unanimous opinion that the mass was injected, and from below upward; also that the mass was in either a fluid or semi-fluid condition. Professor Hitchcock believes that the Albertite has been injected at two distinct periods. He also describes "horses" or enclosed pieces of the wall-rock, as common in the vein. Professor Wurtz describes one of these masses as occurring in the Grahamite, but a few feet below the cavity from which it fell. The vein of Albertite has been mined to the depth of 1000 feet without diminishing in thickness; it forms the crown of an anticlinal, the walls pressing against it with sufficient force to granulate the mineral, and crush large sticks of timber as they close behind the miners. In all these veins the lines of demarcation between the "veins" and "country" are clearly drawn, there being no intervening mass of rock more or less completely saturated with bitumen.§

The thickening of *petroleum* to a solid mass, by either evaporation or oxidation, or both combined, is an exceedingly slow process. Even in California, where the change takes place most rapidly, months, if not years, are required to cause the oil to become asphaltum, even when it is spread out in a thin pellicle, and exposed freely to the atmosphere and an unclouded sun. Neither Grahamite nor Albertite could have been derived from oil like those of California, becoming dense from decomposition, as they both yield paraffin, but must have been derived, if derived from petroleum at all, from the more stable class represented by those of Pennsylvania which thicken by evaporation, or from an oil partaking of the characters of those of both regions.

Let the prior existence of a subterranean pool of petroleum be admitted. The fissure is formed and the oil enters it. In the case of the Albertite, what held the walls asunder while the oxidation was in process of completion—a process which after a solid pellicle was once formed would go on more and more slowly, as it proceeded downwards? What held the masses of wall-rock suspended but a few feet below the cavity from which they fell, while the oxidation was in process? What has become of the remainder of which these enormous masses are *only the residue?*

Is the hypothesis of their derivation from petroleum more acceptable, if it be admitted that the substance entered the fissure in a semi-solid condition? The fissure opened and was filled. The filling could not be gradual by infiltration, else the same questions arise respecting the wall-rock and the "horses." The oxidation must then have been completed at a depth of more than 1000 feet below the surface. Through what agency could the oxidation have been effected at that depth? In California, petroleums were found changed by oxidation at a depth of nearly 500 feet; the change, however, was only slight; they were still *fluids.* The strata too, in that region, are very much broken and porous, wherever the oils are oxidized beneath the surface. If the veins were filled by a residue from the evaporation of petroleum, the evaporation must have taken place at a great depth by internal heat—certainly not by the sun's rays. What then became of the lighter portion, amounting to from 90 to 95 per cent.? Did the formation contain fissures into which the vapours arose and were condensed? If such is the case, why is not Hillsborough County, New Brunswick, one of the richest petroleum regions in the world? Is it probable that so vast a quantity would have escaped so as to leave only traces at present? In Canada and New York, such veins are remote from springs of petroleum, and are usually, if not always, found in metamorphic strata.

This hypothesis presupposes a subterranean sea of petroleum. The quantity must have been vast, or the fissure could not have been at once filled with the residue. Its accumulation must have been finished before the distillation began, as it could not have been fed from above downward, as hydrostatic pressure constantly forces oil towards the surface; neither could it have been fed laterally for the same reason; nor could it have been fed from beneath, unless we suppose the mass to represent one product in a system of fractional condensation. Distillation commences; if the cavity were hermetically sealed, enormous pressure is generated, and a corresponding increase of temperature required for further distillation. The pressure increases until the crust of the earth is ruptured, and from 90 to 95 per cent. escapes as vapour, leaving a perfectly homogeneous mass which is forced by the collapse into the fissure, and solidifies on cooling. If the cavity were not sealed, and the temperature gradually decreased towards the surface, fractional condensation in the crevices of the rocks must be the result, the heavier portions succeeding the lighter as the descent was made. This latter supposition makes no provision for the ruptured crust and filling of the fissure, nor for the absence of petroleum in the immediate vicinity, of every degree of density.

The first hypothesis—that the veins were ever filled with liquid petroleum—appears to me to be impossible; the second—that they were filled with the material in its present form, a residue from the distillation of petroleum—may be possible but not probable.

The hypothesis first announced by Professor Wurtz is at every step in strict conformity with well-known facts, and it is surprising that it should have escaped the attention of geologists and chemists for so long a time. It is remarkable that Professor Lesley should have cited the fact that quartz veins cut injected veins of bitumen in the state of New York, as proof of the aqueous origin of the quartz, and not have ascribed the origin of the bitumen to the same cause, acting upon different materials.‖ Mr. Vanuxem thus speaks of these minerals: "The anthracite of this rock, from its appearance in the form

* Proceedings of the American Philosophical Society, x., 457.

† *Ibid*, ix., 183.

‡ Report on a Mineral Formation in West Virginia, by Professor Henry Wurtz, to the Ritchie Mineral Resin and Oil Company, Baltimore, Md.

§ *American Journal of Science and Arts*, II., xxxix, 272.

* Preliminary Report on the Geology of New Brunswick, chap. v.

† Coal or Asphalte, an Inquiry into the proper Classification of the Albertite of New Brunswick.

‡ Annual of Scientific Discovery, 1866-7, p. 237. Proceedings of the Boston Society of Natural History, 1866. At the recent meeting of the American Association, Professor Wurtz stated that the Colorado bitumens resembled Albertite; they are not, therefore, allied to the California asphaltes.

§ For authorities, see papers before quoted.

‖ *Loc. cit.* (note.)

of drops or buttons, and as before noticed, proves that its previous nature was bituminous, its own being infusible; and shows the heat not dry but humid, to which the greater part of the rock had been subjected, and which readily accounts for the numerous siliceous and other products which are common to it." *

It is a fact well known to technologists in coal oil, that the lower the temperature at which coals or shales are distilled, and the more slowly the process is conducted, the more dense and copious will be the product. So far is an excess of heat to be avoided, that the most improved methods reject the upright retorts which necessitate sufficient pressure to throw the vapours into the worm, and apply the heat at the upper surface with a downward draught, by which the products of combustion are made to pass through the mass to be distilled, and bear away all the volatile products at the lowest possible temperature. Also when the substance to be distilled melts at a temperature below the point at which distillation commences, the use of superheated steam not only increases the quantity of the distillate, but also its density. This fact is proved most conclusively, by a comparison of the results first obtained in the manufacture of Albertite itself, with the results of the latest and most improved process.

It only becomes necessary, therefore, to subject pyroschists like the Albert shales, rich in bituminous matter, to metamorphic action through the agency of aqueous vapour, and the distillation of the volatile matter at the lowest possible temperature becomes a necessity. As time always enters as an element into the operations of nature in sufficient quantity, all the conditions would be present requisite to the production of the most copious and dense distillate which such materials were capable of furnishing. It is impossible to conceive of the metamorphosis of such rocks, containing large cavities in comparatively free communication with the surface, without producing such a result. Without such free communication, pressure, and consequently a higher temperature, would produce more or less volatile liquids, and naphtha springs would be the result. Humboldt speaks of having observed metamorphic rocks near Cumana containing bitumen, and not far distant he also saw naphtha floating upon the sea, into which streams of hot water were injected from subterranean springs in such quantity as to raise its temperature perceptibly.† In one of the recent numbers of this journal the results are given of an analysis of a specimen of mica schist from Sweden containing bitumen.‡ According to Dr. Taylor, the rocks enclosing the asphaltum veins in Cuba are metamorphic slate. The Albert shales forming the wall-rock of the vein of Albertite are metamorphosed. The rocks in which veins of bitumen occur in New York and Canada are metamorphic, in many instances having been subjected to a secondary action, which has rendered the rocks crystalline, and expelled nearly all of the volatile matter, leaving but little more than coke, resembling anthracite.§ Quartz veins have cut the vein of bitumen during this secondary action. Masses of melted bitumen have formed the nucleus around which quartz or calcite began to crystallize, and afterwards in cooling hardened in botryoidal masses upon the crystals. In a few instances minute drops or irregular fragments became entangled in the crystals themselves. The idea that petroleum has been inspissated from the centre of a geode of quartz, or from an hermetically sealed cavity of calcareous rock is opposed to all that is known in reference to that substance. The bitumen had ceased to be petroleum before the rocks enclosing it assumed their present form. If the Albert shales were subjected to such action as would render them crystalline, it is probable that all the phenomena witnessed in New York and Canada would there be observed on a gigantic scale. The fact that the rocks enclosing the Grahamite are unaltered is no proof that they are unaltered at the point at which the bitumen originated.

Professor Wurtz mentions two facts as observed in connexion with the Grahamite which renders the supposition impossible that the fissure was ever filled with a liquid. They are, first, the occurrence of "horses;" and second, the fact that the porous wall-rock of sandstone is not penetrated by the bitumen. The occurrence of "horses" is equally conclusive proof that the injection did not take place into a previously formed fissure. The determination of the cause which produced the fissure is not essential; its *position* in reference to the subterranean pool of melted bitumen was no doubt determined by the pressure exerted by compressed gaseous hydrocarbons which accompanied the melted mass. The injection was no doubt caused by the collapse of the subterranean chamber, and partial expulsion of its contents.

The occurrence of asphaltum at La Goleta (Hill's Ranch), a few miles west of Santa Barbara, on the coast of Southern California, is noticed by Professor Whitney. The wood-cuts which accompany this notice, however, are on too limited a scale to convey an adequate impression of the position and relation of the different masses to each other.‖

An injected vein of asphaltic sand occurs here which appears to the eye to be pure asphaltum, but it really contains nearly 50 per cent. of sand. It bears no resemblance to Albertite in its appearance, composition, or in its probable origin. The *injection* of the vein, however, no doubt, took place in a manner strictly analogous to the *injection* of the Albertite. The mass of the former is very small in comparison to that of the latter, and this fact, together with the limited area over which the forces have been exerted, renders a study of the phenomena much more exhaustive and satisfactory.

The vein occurs in a slight indentation of the coast, caused by the wearing down of a bluff between two rocky promontories. The bluff at this point is about 60 feet in height above high water, the sand of the shelving beach beneath it covering the upturned edges of the oil shales, but a few feet in depth. Irregular masses of asphaltum protrude above the water for some distance from the shore, and several irregular veins, some in an horizontal as well as perpendicular position, project from the bluff, with here and there lenticular masses of small extent. From the masses last mentioned a sort of talus decends, connecting them with the shales below. The largest vein stands perpendicularly, and at right angles with the face of the bluff. It cuts the bluff from the base to the summit, and is wedge-shaped, thinning out from 2½ feet in thickness at the bottom to 6 inches at the top.

The bluff is composed of semi-indurated Post-pliocene sandstone. The strata are so slightly curved as to appear horizontal for short distances. A recent deposit a few feet in thickness forms the soil of the plain above. These sandstones rest unconformably upon the edges of the oil shales, which are inclined at an angle of 70° or 80°. From a careful study of the positions of the several masses, it is evident, that since the several veins were filled, not only has the sea advanced a long distance inland, but the entire coast line at this point has experienced a very considerable elevation. Within the memory of those now living in the vicinity, the bluff extended a considerable distance beyond its present verge, the erosion taking place as marked by the uncovering of the large vein, at the rate of about 2½ feet per year. The elevation of the coast line at a recent geological date, is proved by the presence, a short distance farther west, of old beach lines nearly on a level with the present summit of the bluff. On the borders of this ancient beach irregular masses of asphaltic sand are found, mingled with the shells of bivalves, now found off the same coast. The occurrence of these masses indicates that the springs which yield the maltha, which has been observed floating on the sea in this vicinity for the last hundred years, projected their product into the sea at the time when this beach was at the sea level. The maltha now, as then, becomes dense upon exposure, and is cast upon the beach, where it is rolled and mixed with the sand and gravel until it becomes hard asphaltic sand.

It is evident that this maltha at one time arose and saturated the overlying sand, instead of being projected into the sea. The exact method by which this saturation took place is perhaps beyond conjecture, but the inference that it took place beneath the superincumbent mass which then formed the bluff, cannot be avoided. It is equally obvious that the asphaltic mass entered the fissures in a pasty condition; and also that it entered from beneath. The effects of the disturbance which produced the injection, could not, at the time of my visit, be traced below the Post-pliocene formation. This disturbance seemed to have proceeded from a focus about a quarter of a mile from the present beach, and to have lifted and torn asunder the more recent deposit of 60 feet in thickness, which, falling back upon the yielding mass of asphaltum, caught and held a large portion of it in its fissures.

While the matter in which the mass of bitumen collected has not necessarily any direct bearing upon the question of its subsequent injection, the subject is still of much interest. Twenty-five miles east of this point, upon the coast, an equally interesting and unusual deposit of asphaltic sand occurs. In this instance, the sand is spread out horizontally over a very wide area (many hundreds of acres), and uniformly, about 20 feet in thickness, so far as is known. This stratum of asphaltic sand lies unconformably upon the upturned edges of the oil shales, from which the tarry maltha exudes and gradually saturates the sand. Judging from a section of both shales and sand, which appears for nearly a mile along the coast, the saturating process is still in progress.

We have only to suppose this process to take place beneath 60 feet of semi-indurated sandstone, instead of 10 feet of sand and soil, and we have the action which preceded the injection of the vein just described. Again, we have only to imagine a metamorphosis of deep-seated bituminous strata, producing a distillate 1000 or more feet beneath Silurian or Devonian rocks, which gathered in their crevices, and we can readily account for the gathering of the mass of Grahamite or Albertite previous to injection. An earthquake, shrinkage, or the expansive force of pent-up gases, may have caused an upheaval and fracture of the superincumbent mass. It makes no difference whether the fractured mass were 1000, 500, 60, or 10 feet in thickness, in either case, when it fell, it would force a part of the plastic mass into the fissures and hold it there.

At this time only specific names have been given to those bituminous minerals occurring in veins, which are evidently derived from the metamorphosis of bituminous strata. They possess many properties in common, and are essentially unlike the true aspahaltes, which are derived from petroleum. I think it was Dr. Taylor, of Philadelphia, who several years since proposed the name of "Meta-Asphalte" as a generic name for minerals of this class.

* Geology of New York, by L. Vanuxem, part III., p. 34.
† Travels, i., 198; iii., 113, Bohn's edition.
‡ *American Journal of Science and Art* (II.), xlv., 38.
§ Vanuxem; T. S. Hunt, Geol. Surv. Canada, 1866, p. 262.
‖ Rep. Geol. Surv. Cal., Geol. I., 132.

DR. STEVENSON'S REPORT ON THE GAS SUPPLIED BY THE IMPERIAL COMPANY TO THE VESTRY OF ST. PANCRAS DURING THE MONTH OF DECEMBER, 1870.—The average illuminating power of the gas was 14·3 candles, the maximum being 15 candles, the minimum 13·6 candles. The Imperial Gas Act says that the illuminating power shall not be less than 14 candles. On three occasions the gas fell below this minimum, whilst on eight occasions the gas was better, as regards its illuminating power, than the Act requires. The examinations are, however, made according to the Metropolis Gas Act, 1860; if they were made according to the requirements of the gas referees under the Imperial Gas Act, the illuminating power would be apparently increased by one-sixth. The gas was at all times free from sulphuretted hydrogen, as required by the Act. Ammonia was present on eight out of eleven occasions of examination. Its amount was always small. Sulphur was present to the amount of 22·84 grains per 100 cubic feet. T. STEVENSON.

AVERAGE COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS IN THE YEAR 1870.—From the monthly returns of Dr. Letheby to the Association of Medical Officers of Health:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Comps.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	18·53	0·078	0·076	0·002	14·2	3·7
West Middlesex	18·43	0·053	0·095	0·001	14·0	3·7
Southwark and Vauxhall	18·37	0·077	0·073	0·003	14·2	3·9
Chelsea	18·67	0·085	0·080	0·002	14·3	3·8
Lambeth	19·04	0·071	0·081	0·002	14·3	3·9
Other Companies.						
Kent	27·31	0·011	0·142	0·000	20·0	5·2
New River	18·31	0·024	0·086	0·000	14·0	3·5
East London	18·62	0·041	0·093	0·001	14·1	3·8

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The fluctuations in the proportions of soluble matters have not been considerable, although the largest amounts have been found in all the waters supplied to the metropolis during the winter months, and the smallest in summer, when the rainfall was least. The water was found to be clear and nearly colourless in all cases but the following, when it was more or less turbid from imperfect filtration—namely, twice in the case of the Grand Junction water, four times in that of the Chelsea, and four times in the Lambeth. The average quantity of water supplied daily to the metropolis during the year was 104,003,947 gallons, and the average number of houses supplied was 477,916. This is at the rate of 32·3 gallons per head of the population daily; and the particulars of the supply are as follow:—

NAMES OF WATER COMPANIES.	Average Daily Supply. Number of Gallons.	Number of Houses.
Thames Water Companies	53,684,665	219,312
Grand Junction	10,734,368	30,929
West Middlesex	8,814,045	40,887
Southwark and Vauxhall	15,622,730	77,076
Chelsea	8,167,208	25,518
Lambeth	10,346,314	44,902
Other Companies.	50,319,282	258,604
Kent	7,439,899	39,521
New River	23,198,417	117,845
East London	19,680,966	101,238
Total	104,003,947	477,916

THE GLASGOW GAS.—The following statistics regarding the illuminating power and purity of the Glasgow gas for the quarter ending Dec. 31, 1870, have been supplied to us by Dr. Wallace, F.R.S.E., gas examiner for the city:—

	Townhead Works.	Dalmarnock Works.
Illuminating power of 5 cubic feet per hour in standard candles, average	28·74	28·23
Do., maximum	32·28	31·04
Do., minimum	26·40	25·51
Sulphur, grains in 100 cubic feet of gas, average	12·68	12·25
Do., maximum	18·32	17·88
Do., minimum	6·28	5·23
Ammonia, grains in 100 cubic feet of gas, average	5·42	4·88
Do., maximum	8·93	8·94
Do., minimum	3·17	1·56

The two kinds of gas are tested daily (about six p.m.) at the same station, which is about a quarter of a mile from the Townhead works, and a mile and a half from the Dalmarnock works. The same mixture of coals is used in both works, and hydrated oxide of iron as well as lime is extensively employed in the purification of the gas. Not the slightest trace of sulphuretted hydrogen was observed during the quarter, except on one occasion, when a quantity of unpurified gas escaped accidentally into one of the holders, rendering the gas impure for several days. The gas-works of Glasgow belong to the city, having been acquired from the companies by whom they were erected about a year and a half ago. The illuminating power stipulated in the Glasgow Gas Act is 25 candles, but there is no limit defined as regards sulphur and ammonia. The price is 4s. 2d. per 1000 cubic feet.—*Chemical News.*

GAS EXPLOSION.—An explosion, attended with serious, and it is feared fatal consequences, took place on Thursday in the private residence of Mr. F. May, 1, Cavendish Place, St. John's Wood. A smell of gas had been for some time prevalent in the house, and, on a search being made with a light for the place where the escape existed, a violent explosion occurred. A woman, named Mrs. Webb, was hurled across the room, and her clothes set on fire, and the furniture both of the first and second floors was smashed. Mrs. Webb was found subsequently to be so seriously injured as to necessitate her immediate removal to the hospital, where she now lies in a hopeless condition.

FATAL GAS EXPLOSION AT WORCESTER, MASSACHUSETTS.—An accident resulting in the death of a most estimable man occurred recently at the gas-works, Worcester, Mass. Some new purifiers had been put up, and somehow or other an escape of gas took place; and on the manager, Mr. Blake, entering the purifying-house with a lantern, an explosion happened producing injuries which, as we have said, resulted in his death. Besides being manager of the gas-works, Mr. Blake was mayor, and a man of mark in the city, and his death is sincerely mourned by the whole community.

GASLIGHT IN THE CONSERVATORY.—Before we quit this subject for the present, we must offer two remarks, which we believe will tend more than all we have said hitherto towards a clear understanding of what may and what may not be done in the way of illuminating plant-houses by means of gas. To light up a small house with gas will be to expose to the risk of destruction every plant within, no matter whether its leaves be hard or soft. To light up a large house having plenty of head room with gas will be to reduce the risk of injury so much that even soft-leaved plants may escape serious injury. The terms "large" and "small" are so relative that we must leave our readers to interpret them at discretion; but we can safely say that the larger the structure in which plants are housed, the more safely may it be lighted with gas, no matter what particular plants are its occupants. Another matter of the profoundest importance in connexion with the use of gas for lighting up, is ventilation. A mere breeze blowing through a gas-lighted house on a frosty night may do more harm than the gas, but free ventilation judiciously directed may be advised as the most powerful of direct andidotes to the baneful effects of gas. Here again, all is relative, but the practical reader will understand us when we say that so long as gas-jets are burning in plant-houses the ventilation should be liberal and verging on excess. As to air, indeed, the more the merrier, provided only there does not come upon the plants a breath too much.—*Gardener's Magazine.*

Register of New Patents.

118.—GEORGE THORNELOE, of 34, London Wall, in the City of London, gas engineer, for "*A new flexible valve for regulating the flow of fluids in pipes, also used in apparatus for the manufacture of gas.*" Patent dated Jan. 13, 1870.

This invention consists of a valve formed by a metallic plate or disc in the shape of a hollow cone so constructed that a force applied at the apex becomes equally distributed around the outer edge of its base. It is made of such a thickness as to be slightly flexible under the pressure which closes it, in order that its edge shall adapt itself to the face or seat of the valve and make a tight joint. The edge or face of the cone is turned to a true surface, and may vary in thickness, but it is found best in practice to make the surfaces in contact about one-eighth of an inch wide, in order that there may be as little chance as possible of the lodgment of dirt or grit, which might prevent the faces of the valve coming into perfect contact. The valve may be moved to and fro by means of a rack and pinion, a screw, or any other method usually employed for that purpose. The force to close the valve is applied at its centre, either by means of a metallic cross-bar fixed in the valve-case or attached to the valve itself, or by means of other apparatus. When the cross-bar is used for applying the force to close the valve, it does so by coming into contact with a wedge-shaped piece of metal on the back of the valve itself, or by two wedges in the valve-casting just before the valve arrives at its ultimate position. The cross-bar is set at such an angle that when seized by the projection on the back of the valve, it receives the closing force on its edge in the direction of its greatest strength, and applies such force to hold the valve tight against the corresponding face or seat.

Fig. 1 is a perspective view, and Fig. 2. a section of a valve constructed on

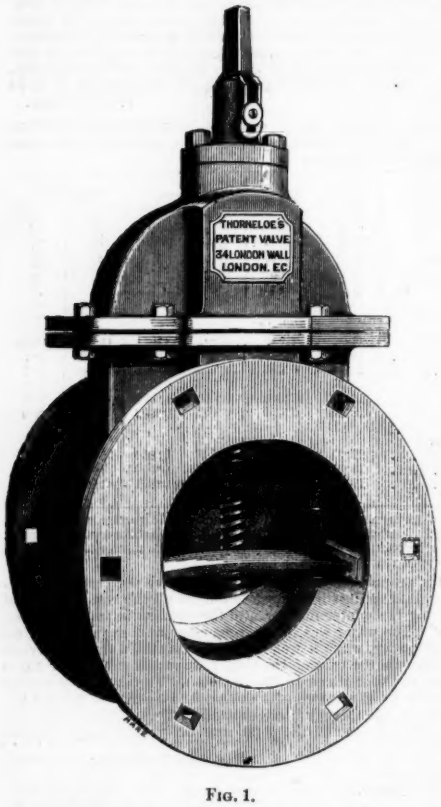

FIG. 1.

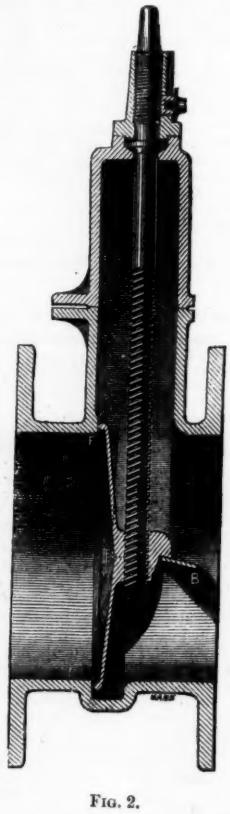

FIG. 2.

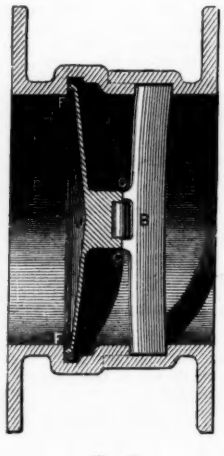

FIG. 3

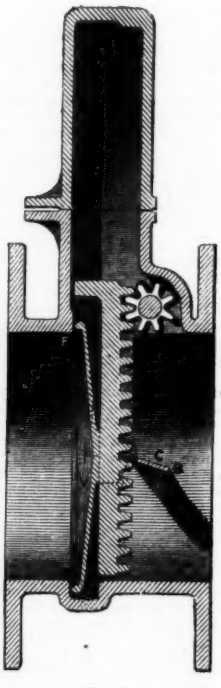

FIG. 4.

the foregoing principles, adapted for opening and closing by means of a screw. Fig. 3 is a sectional plan, and Fig. 4 a vertical section of a valve adapted for opening and closing by means of a rack and pinion. B., Figs. 2, 3, and 4, shows the metallic cross-bar placed across the valve-case, with the valve V in its position and closed, the point of contact with the cross-bar being at C, at which point the force exerted presses the valve against its seat at F, F. When the valve is slightly or fully opened the force is withdrawn, allowing the valve to move entirely without friction on its faces.

The claims with respect to this invention are:—Firstly, the construction and application of flexible metallic valves as herein described, which are closed by a force applied at the centre and distributed equally around the circumference of the base; and, secondly, the construction and application of metallic cross-bars for directing the force for closing the valves wherever it may be required.

133.—FRANCIS GEORGE FLEURY, of Merrick Square, Southwark, in the co. of Surrey, engineer, for "*Improvements in apparatus for drawing or raising and forcing liquids.*" Provisional protection only obtained. Dated Jan. 15, 1870.

This invention consists in the employment of a series of tapering or other pipes, tubes, or passages, arranged in a semicircular or curved direction in a steam-chamber. These pipes, tubes, or passages communicate with the liquid to be raised and forced, and with the boiler or vessel into which the same is to be fed, and their respective ends are peculiarly arranged with reference to one another, so as to form a series of slits, openings, or annular spaces, by which communication is effected between the steam-chamber and the interiors of the pipes, tubes, or passages.

143.—THEODORE BYRON HUBBELL, of Kentish Town, in the co. of Middlesex, for "*A novel arrangement and construction of gas-burner.*" Provisional protection only obtained. Dated Jan. 18, 1870.

This invention relates to a novel arrangement and construction of gas-burner

which is caused to rotate by the emission or escape of the gas from orifices or jets in projecting arms arranged at angles to the main tube of the burner. The rotating action is caused by the backward pressure of the gas as it escapes in like manner to the action of water in what is known as "Barker's mill."

In carrying out this invention it is preferred to form the vertical, horizontal, and inclined tubes which constitute the rotating gas-burner, of glass (although metal or other material may be employed). The burner rotates in a vessel or tube containing water or other fluid, so as to form a "water-joint" to the vertical tube of the burner. The ends of the glass tubes forming the burner have metal cups fitted thereon, through which the jets of gas issue. The form and arrangement of the tubes of rotating burners constructed in accordance with this invention may be greatly varied, but may simply consist of a vertical tube, having branch tubes at the upper part arranged at right angles, or otherwise, and furnished with orifices to form suitable jets when the gas is ignited. The vertical tube of the rotating portion of the burner is closed at the top end, and is arranged to rest so as to support the burner upon a needle or other suitable point to form a bearing on which the burner rotates with as little friction as possible. The rotating vertical tube descends into a vessel or tube containing water, through which the inlet tube for the gas rises, and is formed with a point, upon which the inner upper end of the rotating vertical tube of the gas-burner is supported. The gas issues from an orifice at the top of the inlet-tube into the vertical tube of the rotating burner, and is prevented from escaping, except at the proper outlet jets, by the water-joint sealing the space between the gas inlet-tube and the tube of the rotating burner. Figures or other objects may be mounted upon and arranged to rotate in combination with rotating gas-burners, constructed in accordance with this invention, whereby very novel, attractive, and ornamental effects may be obtained for the purposes of illumination.

153.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in the treatment of acid tars obtained from boghead mineral schist or petroleum.*" A communication. Patent dated Jan. 18, 1870.

This invention has for its object the converting into commercial products the acid tars or oils derived from the treatment and purification of schist oils and petroleum. The process consists in completely separating the tar so as to render it commercially available, and to form the sulphuric acid into a combination having a commercial value which may become equal to that of the acid itself, and of the reagent employed. If acid tar be treated with a solution (as concentrated as possible) of common salt, the sulphuric acid will be completely separated in the form of sulphate of soda.

Assume 2000 pounds of acid tar or oil containing 30 per cent., say 600 pounds of sulphuric acid, this is to be treated with 720 pounds of common salt dissolved in the smallest possible quantity of water (by preference warm water), say from 180 to 190 gallons. The warm solution is poured upon the tar, which remains at first at the bottom of the vessel, but by degrees it loses its acid and rises to the surface. After one hour's treatment the whole is allowed to settle for 10 or 12 hours, and the acid liquor is then drawn off by a discharge-cock disposed at the bottom of the trough, or by a syphon. This acid solution having been evaporated to dryness, and heated until it assumes a thick or pasty condition, will yield neutral sulphate of soda. This operation may be carried out by any of the methods employed in the manufacture of sulphate of soda and chlorhydric acid. The furnace method will in all cases be preferable, itbeing observed that as the operation is performed on liquids it is useful to commence the distillation by concentration in suitable closed vessels until the mass upon cooling becomes capable of being charged into the furnace.

The operation is the same for acid oils, but it is of shorter duration: half an hour of contact is sufficient, and after two hours settling the separation of the two liquids (the oil and saline solution) is complete.

With regard to the acid waters resulting from the washing of the oils, these are treated directly with salt without dissolving, and are evaporated to dryness as described.

The anhydrous sulphate of soda obtained in these various processes may be then dissolved in a small quantity of water, slightly heated (2000 pounds of this salt requires from 600 to 640 pounds of water at a temperature of from 86° to 104° Fahrenheit), and on cooling there are deposited voluminous crystals of Glauber's salt, SO_3, Nao + 10 Ho. The tar which has been separated is then washed with a large quantity of water, and after being allowed to settle for a sufficient time, and after decanting, the operation is completed, and the tar is then treated with a weak alkaline solution.

Ammonia may be substituted for common salt where that alkali is produced near the works; sulphate of ammonia is then obtained, the commercial value of which is becoming daily enhanced.

There remains, finally, an excellent tar, which is preferable to the heavier tar for many purposes.

Assuming that it is required to treat at each operation a quantity of tar, containing about 400 pounds of sulphuric acid, or, say, in this case about 560 pounds, the tar is introduced into a vessel lined with lead, of a capacity of from 140 to 160 gallons. The operator takes 480 pounds of common salt (200 pounds SO^3 HO, requiring 240 pounds of salt), about 200 pounds of which, or rather less than one-half, is placed aside; the rest is then dissolved in about 40 gallons of warm water, and the partially dissolved salt is poured on the acid tar; acid sulphate of soda is thereby formed, and the excess of salt dissolves. The vessel then contains about 1000 pounds of the liquid, which is withdrawn, and poured into one of the evaporating boilers. Chlorhydric acid is distilled under the influence of heat, and is collected in vessels provided for that purpose. When the contents of the boiler have assumed almost a pasty condition, they are transferred to the furnace, where the remainder of the before-mentioned proportion of salt has been disposed, and then the whole is gradually heated. The chlorhydric acid gas which is evolved passes into the vessels before referred to, whereby the acid is collected, and made commercially available.

There will thus be obtained in 12 or 13 hours working 4000 pounds of chlorhydric acid, at about 21° Baumé, 3400 pounds of anhydrous sulphate of soda perfectly pure, and 1000 pounds of tar nutralized and purified, which may be employed as fuel in conjunction with coal or coke, or otherwise.

200.—WILLIAM HENRY BERRY, engineer, GEORGE JOWETT, mechanic, and JAMES WOOD, manager, all of Sowerby Bridge, in the co. of York, for "*Improvements in water or other liquid or fluid meters.*" Provisional protection only obtained. Dated Jan. 22, 1870.

These improvements consist in the construction of a stationary cylindrical vessel, the inner circumference of which is formed of two different radii or semi-diameters. In one end of the cylinder is an inlet, and in the periphery thereof is an outlet for the water or other fluid required to be measured, and fixed to the said end in the interior is a hollow stud or bearing, with an opening in one part thereof. Mounted on this stud is a rotary cylindrical boss, of suitable diameter to fit to the inner surface of the smaller inner diameter of the vessel, thus leaving an annular space betwixt the said boss and the larger diameter of the vessel, which is about the semi-circumference thereof.

228.—CROMWELL FLEETWOOD VARLEY, of Beckenham, in the co. of Kent, and THEODORE ANTHONY ROCHUSSEN, of Abchurch Lane, in the City of London, for "*Improvements in producing heat and light.*" Patent dated Jan. 25, 1870.

The object of the first part of this invention is to obtain a larger amount of steam from a given quantity of fuel. When coal is burnt, the solid coal is turned into gas, a large portion of heat becomes latent and is wasted by volatilizing the solid. The oxygen of the atmosphere is a gas by reason of the large amount of heat combined with it. When zinc, iron, or manganese are burnt, the resulting oxide is a dense solid; little or no heat is wasted, as it is not turned into vapour. In addition to this, the cosmical heat latent in the oxygen of the atmosphere is obtained, and the result is that one pound of zinc will evaporate more than four times as much water as one pound of coal, the advantage of which on long sea voyages is obvious. The zinc or other metal thus becomes a vehicle of power much larger than can be obtained from the same weight or bulk of coal, and the oxide of the metal may subsequently be economically reduced at any convenient place where coal is accessible.

The second part of this invention relates to the production of light superior to the lime-light, and scarcely, if at all, inferior to the electric, and this is effected by burning a continuous jet of metal either in a molten or gaseous state.

231.—ALFRED VINCENT NEWTON, of 66, Chancery Lane, in the co. of Middlesex, mechanical draughtsman, for "*An improved construction of meter.*" A communication. Provisional protection only obtained. Dated Jan. 25, 1870.

In carrying out this invention a reciprocating lever diaphragm or piston is used, the same being arranged to work within a measuring-chamber of arched or sector-like form. This diaphragm is made with a hub, through which is a pivot-pin that constitutes the turning axis or centre of said diaphragm or lever-piston. It is preferred to so arrange the meter as that the pivot-pin occupies a vertical position. This hub is formed hollow, but closed at its ends, the lower one of which rests on and travels over the lower face of the measuring-chamber. This hub is preferably made in two, or upper and lower sections, the lower one being loose on the pivot, and only moved towards the completion of the stroke of the lever-piston through means connected with the upper section, which latter moves continuously with the piston.

259.—EDMUND SMALL CATHELS, of Aberdalgie Lodge, Lower Sydenham, Kent, gas engineer, and DAVID TERRACE, of 77, Mortimer Road, De Beauvoir Town, Middlesex, mechanical engineer, for "*Improvements in apparatus used in the manufacture of gas, part of which apparatus is also applicable for ventilating mines, for promoting combustion, and for pumping, measuring, and forcing fluids.*" Patent dated Jan. 28, 1870.

This invention relates, firstly, to an improved apparatus for maintaining a continuous exhaust in the pipes, conveying the gas from the retorts in which it is generated, thereby removing the pressure from the interior of the retorts. It is also applicable for blowing pure air into or extracting foul air from mines; for blowing air into furnaces, cupolas, or such other places where a blast or an exhaust is necessary; and for pumping, forcing, and measuring fluids.

The exhauster or blower is constructed as follows:—There is an outer case of cast iron, with flat ends, and semicircular top and bottom, having inlet and outlet ports, which may be either circular, square, or oblong. Within this case there are two cast-iron elliptical cams, which are by preference made hollow, and may be filled with gypsum, sawdust, or other suitable material to deaden the sound when the exhauster is in action. These cams are so shaped and placed that they revolve nearly, though not quite in contact with each other, and with the semicircular top and bottom of the case, so that when they are at rest the passage of the gas or other fluid is entirely or almost entirely stopped. Each cam is keyed on a shaft or axle which passes through, and works in suitable bearings and stuffing-boxes in the end plates of the case. The axles are geared together by spur-wheels keyed on them at one or both ends outside the ends of the case, and may be either open or enclosed. Motion is imparted to the cams by means of a driving-pulley fixed to the lower axle (which extends beyond the upper one for that purpose), and by which the cams are made to revolve in opposite directions. If the exhauster or blower is used for measuring liquids, any convenient number of wheels, with indicating dials, may be connected with one of the axles, and as the quantity of gas or fluid passed at each revolution is equal to the cubical contents of one of the cams, a measure of the quantity passed may be ascertained by counting or registering the number of revolutions.

The exhauster as thus described, and provided with a suitable sole or base and the necessary means of lubrication, is complete of itself, but when used for exhausting gas a self-acting bye-pass valve may be combined with it to permit the passage of the gas from the retorts should the exhauster accidentally stop instead of the separate self-acting bye-pass apparatus usually employed for that purpose. The bye-pass is constructed in accordance with the following description:—Both the inlet and outlet ports have on their upper sides openings that are in communication with an annular space or jacket that passes over the upper semicircular side of the outside case of the exhauster. The opening at the inlet side is faced, and a valve fitted on it of faced metal, of iron faced with wood, or of other suitable material, such valve being weighted if required to keep closed when the exhauster is in action. As the valve is free to lift on guide-pins or to open on a hinge, the pressure of the gas issuing from the retorts forces it open in the event of the exhauster accidentally stopping, and the gas flows through such valve and annular space to the outlet side of the exhauster. The valve may be fitted on each side of the exhauster to suit the line of piping to which it is to be attached, either side serving as the inlet. A moveable plate or door, secured by bolts, is provided for getting at the valve when required. This self-acting valve may be also made to serve the purpose of the butterfly or throttle valve, usually fitted in a pipe connecting the pipes leading to and from the exhauster, which is actuated by a small gasholder in connexion with the inlet-pipe of the exhauster for preventing an undue exhaust. This is attained by the rod from the gasholder being so attached to the lever or bell-crank fixed to the valve that when there is too much exhaust in the pipe leading to the exhauster the valve will be slightly opened, and allow some of the gas to flow back and pass through the exhauster again, until the extra work thus given to the engine reduces its speed to the proper requirement. But in the event of the exhauster accidentally stopping, the valve will be free to operate as a self-acting bye-pass valve in the manner already described, independently of the rod and lever in connexion with the gasholder.

The invention relates, secondly, to a bye-pass valve in connexion with the exhauster which answers the purpose of three ordinary valves, by enabling the exhauster to be shut off when required for repairs or other purpose, and the gas to pass by. It is an improvement on and simplification of the valve for this purpose for which the said Edmund Small Cathels obtained letters patent on Nov. 14, 1863. It is also applicable as a bye-pass to other gas apparatus, and as a valve for purifiers, and under certain modifications, to be hereafter described, for steam or other fluids.

The improvements consist chiefly in considerably reducing the size and weight of the valve without diminishing the area; of the passages in the ports being all on the same level, instead of on two or more levels, as formerly; in an arrangement of the passages, whereby both discs are moved up or down together, instead of one being up and one down as previously, and in a simplified mode of actuating the discs.

315.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in gas and other pressure regulators.*" A communication. Patent dated Feb. 3, 1870.

This invention relates more particularly to a peculiar construction and arrangement of apparatus for regulating the pressure and volume of gas to be consumed by any ordinary burner, and is also applicable as a regulator for air, steam, or liquids.

As adapted for a gas-regulator, this apparatus consists essentially of two communicating chambers, separated by a moveable bell, in the crown of which is an aperture of a given size, forming the communication between the two chambers. This aperture is of such dimensions that it will supply the volume of gas to be consumed at a pressure equal to that which balances the weight of the

bell. This bell carries the valve which controls the inlet of gas into the regulator. The burner is fitted on to the top of the outer one of the two chambers, and the regulator is screwed on to the end of the pipe where the burner is usually applied. The mouth of the bell is sealed by dipping into glycerine, contained in the outer chamber. According as the volume or pressure of gas in the inner chamber increases or decreases, so will the bell be raised or lowered thereby, at the same time more or less closing or opening the inlet-pipe. Should the pressure be below that which is requisite to balance the bell, the gas will still flow through the opening in the crown of the bell, and pass off through the burner at its normal pressure.

The regulators are so constructed as to ensure a constant supply of a given and regulated volume of gas, notwithstanding any difference of pressure which might be caused by the employment of different burners or outlets, so that a more equitable consumption may be thereby effected. For this purpose there are provided in the course of or in the gas passages two communicating chambers, separated by a moveable bell, in the crown of which the fixed aperture is formed for the purpose of communicating between the chambers. This aperture is made of such a section as to be capable of supplying the volume to be consumed under a pressure equal to that which will balance the bell. The bell carries the cone which forms the valve necessary to effect such regulation with this kind of apparatus. It follows from this arrangement that when the current passes through the regulator, two different densities are formed simultaneously in the two communicating chambers. The difference in the densities results from the weight of the bell, and, consequently, remains constant. One density—viz, that below the burner, and above the bell, corresponds to the pressure necessary to supply to the burner the volume to be consumed. The other density—viz., that beneath the bell, exceeds the pressure at or under the burner by the difference resulting from the weight of the bell, and it is by reason of this difference that the communicating aperture admits of the passage from one chamber to the other at the desired density of the volume to be consumed. The admission-valve assumes automatically the position requisite to produce in all cases the results hereinbefore described, since it is solely the difference of pressure in the two communicating chambers which becomes the determining cause of the movements by which the valve augments or diminishes the volume of gas introduced into the regulator.

With this dry regulator the valve known as Naylor's may also be utilized by reversing the same.

340.—HEINRICH WITTHÖFT, of Copenhagen, in the kingdom of Denmark, for "*Improvements in gas-burners.*" Patent dated Feb. 5, 1870.

The object of this invention is to regulate the pressure of the gas by regulation of the burner itself.

The nature of this invention consists in an inside regulating-valve in the shape of a screw, by preference with a cone point and a square head. This valve is screwed in from below into the bottom of the upper hollow brass part of the burner. The more it is screwed in the more will the point or end close one or more holes in the side of said upper brass part, which is screwed into a corresponding brass socket, which again is screwed into the gas-pipe, and has one or more holes at the bottom for the admission of the gas to the interior of the burner. There is a clearance between the upper brass part and its socket, where the holes in the former are situated to admit of the entrance of the gas through the same. On removing the upper brass part, which constitutes the burner itself, the regulating-valve or screw may be turned one way or the other as required, and the burner then screwed into its socket again. It will be observed that this construction of burner prevents unnecessary meddling with the regulation of the gas.

364.—GEORGE WILLIAM WIGNER, of 1, St. Swithin's Lane, in the City of London, analytical chemist, for "*Improvements in the mode of and apparatus for treating and purifying sewage.*" Patent dated Feb. 8, 1870.

These improvements consist, first, in the use of a pit or tank, which is termed a "catch-pit," through which the sewage is caused to pass slowly on its way from the main sewer, or other source, to the mixing-pit, in order that the said sewage may be caused to deposit a portion of its sand and other insoluble matter, which falls to the bottom of the catch-pit, which is made sloping, and is furnished with a channel for the conveyance of the matters so deposited, and a well for their reception. As such matters settle, they are conveyed by the channel to the well, whence they are removed in any convenient manner.

368.—ANDREW AINSLIE COMMON, of South Bank, Regent's Park, in the co. of Middlesex, engineer, for "*Improvements in apparatus for regulating the supply of water to water-closets, and wherever a regulated supply may be required.*" Provisional protection only obtained. Dated Feb. 8, 1870.

According to this invention, it is proposed to regulate the action of the lever working the valve or cock of a supply to water-closets by attaching the said lever to the head of a hollow piston-rod working within a closed cylindrical or other shaped vessel fixed at the bottom. At the lower part of the hollow piston-rod is a piston with a valve to give passage to the liquid contained in the cylinder (glycerine, mercury, or other liquid of a similar nature) in the ascent of the piston, which piston is also pierced with a centre hole to give passage to a regulated flow in its descent, this flow being regulated by means of a solid rod working within the hollow piston-rod, the lever end of the said solid piston-rod being tapered to fit into the central hole of the piston, while its upper end within the head of the hollow piston-rod is provided with a screw, by turning which it may be raised or lowered at pleasure, thereby passing more or less into central hole of piston, and thus regulating the flow of liquid.

393.—JAMES THOMSON, of 18, Whittington Road, Peckham. and WILLIAM THOMSON, of 22, Carlton Square, Peckham, for "*Improvements in ventilation of chimneys and apartments.*" Provisional protection only obtained. Dated Feb. 10, 1870.

These improvements consist in the use of a piece of sheet-iron or zinc, about 5 in. deep, made to fit the chimney breast, to which is attached by the two ends and top at the distance of an inch a triangular tube, having one of its sides at the right angle perforated, forming a blower, which is connected to a tube passing through the cheek of the fireplace, down through the floor of the room, to an aperture in the outer wall.

398.—WILLIAM M'GEORGE MASON and THOMAS LOCKERBIE, both of Glasgow, in the co. of Lanark, N.B., for "*Improvements in utilizing water pressure in raising liquids, and in apparatus therefor; also in pressure-reducing valves for the said apparatus, and applicable otherwise.*" Patent dated Feb. 10, 1870.

This improved apparatus for utilizing the surplus water pressure consist of a vessel, which may be of any suitable shape or material, and which is divided into three compartments. One compartment is the reservoir for compressed air, whilst the other two are filled with inlet and outlet pipes for water at the bottom, and with valves at the top for air. The water is admitted from the service-pipe through a reducing-valve, and thence through a four-way cock to one of the two water compartments, which it fills, forcing the air from it into the air-reservoir. When one water compartment, for example, is filled, the cock is turned to let the water off from it by the crane or swan neck, and to put the other compartment in communication with the service-pipe.

411.—JAMES SMART, of Stratford, in the co. of Essex, engineer, for "*Improvements in slide valves.*" Patent dated Feb. 11, 1870.

This improved slide-valve is made hollow, the steam passing from one side of the valve through the same, and then through the ports on the cylinder face, which stand the ordinary way. The steam admission side of the valve works steam-tight against a corresponding face, and has two parts corresponding with and communicating each with its port at the cylinder face. The opposite side of the valve also works steam-tight against a face, and has one or more port-like openings (but without corresponding ports in the face it works against) communicating with the steam inside the slide-valve, the object of the openings being to relieve the pressure or friction against the face.

422.—JAMES MORRISON, of Glasgow, in the co. of Lanark, N.B., out-door officer in H.M. Customs, for "*Improvements in gas-stoves.*" Patent dated Feb. 12 1870.

This invention has for its object to consume the unburnt gases and smoke, and thereby prevent or reduce to a minimum the spread or escape into rooms or apartments of noxious odours from gas-stoves, and this object is effected by providing the upper parts of the stoves with a sufficient number of ducts or passages, into which the unburnt gases and smoke pass, and by which they are conducted back into the combustion-chamber of the gas-stove. Any solid residue is deposited in the said ducts or passages, and the condensable matter collects therein or in a chamber or receptacle attached to them, and from which the condensed or deposited matter is withdrawn or allowed to escape.

424.—ALEXANDER PRINCE, of No. 4, Trafalgar Square, Charing Cross, in the co. of Middlesex, for "*Improvements in generating gas from petroleum and other oleaginous substances, and in the apparatus to be employed therein.*" A communication. Provisional protection only obtained. Dated Feb. 12, 1870.

The first part of this invention relates to the production of gas or vapour from petroleum and other oleaginous substances for heating purposes by means of the ordinary steam in use for general purposes, introduced into a suitable vessel containing a certain quantity of petroleum or other oil, which may be perfectly cold, and leaving in the vessel a certain space or room for steam vapour and gas. Heated oil is not necessary by this process other than the heat incident to the steam admitted therein, that is to say, no auxiliary heating surface in the oil or about the same whatever is needed or required. Suitable conducting-pipes having suitable valves convey the gas or vapour to a perforated tube or pipes in the fire-box for use.

The second part of the invention relates to the production of gas or vapour substantially in the same way for illuminating purposes, but with the addition of a certain amount of heating surface to rarefy the gas after it leaves the vessel in which it is generated, and by enriching the same in its passage to the heating-chamber or fire-box as may be found desirable in practical use. For these purposes, suitable vessels for holding and mixing the oil and steam and generating the gas are used. These vessels should be constructed of iron or any suitable material with a diameter of about one-quarter or one-fifth of their length, but other proportions may be equally practical. Suitable pipes or tubes are used, with valves and stop-cocks, for the induction of steam therein and the eduction of gas or vapour therefrom; also pipes, valves, and force-pumps for the induction and supply of oil, with oil-tanks and their appendages as a reservoir for continual use, combining therewith a fire-box and boiler, and burners for the utilization of the gas and the generating of the steam. An auxiliary boiler may be employed for the gas-generating apparatus, or the steam from the boiler may be used by tapping the same.

433.—WILLIAM WHIELDON and JOHN BECK, both of 190, Westminster Bridge Road, in the co. of Surrey, engineers, for "*Improvements in cocks and valves, and in packing for the same.*" Patent dated Feb. 14, 1870.

According to this invention the body of the cock or valve is made of a cylindrical form, either externally or internally, and to this cylindrical part they fit a cap. In some cases the cap is made to turn round, and have passages in it, and the body of the cock is such that when the cap is turned to one position there is a communication through these passages, and when the cap is turned to another position the communication is closed. In other cases the cap is made to slide to and fro, and has fitted to it a leather, caoutchouc, or other soft facing, or is made with a metallic facing fitted to a seating on the body of the cock.

436.—JOHN WEEMS and WILLIAM WEEMS, of Johnstone, in the co. of Renfrew, N.B., engineers, for "*Improvements in the manufacture or production of metallic pipes and sheets, and in making joints therefor.*" Patent dated Feb. 15, 1870.

These improvements consist in having a chamber or receiver for containing the metals fitted with a core-bar acting as the mandrel for shaping the pipe's bore, and placed concentric with the axial line of the metal receiver. A tubular mandrel or ram fitted with a die for forming the outside of pipe fits into the bore of metal receiver, and, by means of hydraulic pressure, the surface of the contained metals or composite ingot of metals is pressed against the die, and, having no other means of escape, the metals exude simultaneously in the form of an encased or lined pipe, through the annular outlet between the core-bar except the die, so that there is no actual frictional contact except at the point of escape of the exuding metals, and the pipe is produced without in any way disturbing the rest of the metal or giving rise to any frictional effect elsewhere, and thereby securing the production of an evenly lined or encased equal pipe.

463.—SIGISMUND LEONI, of 34, St. Paul Street, New North Road, in the co. of Middlesex, manufacturer, for "*Improvements in apparatus for cooking, heating, and lighting by gas.*" Patent dated Feb. 17, 1870.

This invention relates, with reference to cooking apparatus, in the first place, to apparatus for roasting on a large scale. For this purpose the roaster (being a cylindrical case of fire-clay mixed with other clays suitable for the purpose, similar to that described in a patent granted to the present inventor, No. 3124, Oct. 12, 1868) is let into or constructed in a chamber under the kitchen floor, thereby saving space in the kitchen, protecting the apparatus from the effects of draught, and getting rid of smell from dripping by means of underground flues communicating with the existing flues. The several gridirons or meat-carriers are placed in an open iron frame or lift, which is let down as required by means of a crane or otherwise, and guided in its descent in the roasting apparatus by rollers working in grooves or on ribs. The frame or lift is also raised by the said crane to the height required for running out the gridirons or meat-carriers, which are mounted on wheels for the purpose. The reflector (similar to that described in the specification above referred to), fitting over the top of the roasting apparatus when in action, is fixed to the moveable part of the floor, and hinged to the stationary floor, by which arrangement it can be raised as required in order to leave an opening for the working of the frame or lift and gridirons.

The invention with reference to cooking apparatus relates, in the second place, to roasting and baking ovens, being improvements on the ovens described in the specification above referred to. The improved roasting-ovens consist of a muffle, the sides of which may be increased in height by means of tiles or bricks of fire-clay when required for stationary ovens of a large size. An atmospheric gas-ring is laid upon the floor of the oven, which has an opening in the centre for the passage of the dripping into a draw or receptacle, which is in direct communication with the flue for carrying off the fumes and smell as required. The meat-carrier, mounted on wheels, stands on the floor of the oven over the said opening in the centre of the gas-ring, by which it is surrounded at the back and sides. The floor of the oven is so arranged that the wheels of the said carrier run in a tramway or on a rail, and in either case there are projecting parts, which come out as the door opens to the full length of the carriage beyond the opening. The front of the oven is enclosed in an iron frame, to which is hinged a door, which may be arranged to open at the side as usual, or to drop down and form a table for the meat-carrier to rest

upon, in which case the door is counterpoised by a weight and chain in a recess between the iron frame and the brickwork. The baking-oven is the same as the above, except that the floor is solid and made in tiles or bricks of fire-clay in preference to iron. The meat-carrier above referred to is an open iron carriage on four wheels, the top part of which carriage is formed with a number of partitions adapted to hold the several joints of meat separately in a vertical position. These partitions are made to slide in and out. The carriages for the roasting-oven are provided with incline plates, so as to form a shoot for the dripping to guide it through the opening of the floor into the drawer or pan underneath. The top of the carriage for the baking-oven is provided with a number of iron shelves for containing bread, pastry, and other articles.

The invention with reference to cooking apparatus relates, in the third place, to improvements in an open kitchen range, for the invention of which a patent was granted to the present inventor, bearing date Nov. 3, 1869, No. 3182, and consists in the application thereto of a cast-iron bed-plate, which may be mounted on wheels, and on which are fitted one or several muffles, the sides of which are enclosed by iron. Between the iron cover and the muffle is inserted non-conducting material, similar to that employed in the cylindrical roasters before referred to. The front is the same as the stationary ovens, and so also are the moveable carriages. The top part is the open range itself. Also an open boiler for hot water may be fitted in the same frame next to an oven under the said range. The whole is fitted with gas apparatus, which only requires to be connected with the meter.

In the inventions above referred to the atmospheric gas apparatus consisted of a single ring with one supply of gas, but in the present invention either the ring with a double supply, that is to say, with an inlet at each end of the ring, each inlet having its own chamber and stop-cock, is used; or double rings, by which the heat can be regulated as required. One of the double rings (usually the inner one) is fitted with small "adamas" jets, and the other with larger jets. By means of the outer rings the heat may be got up rapidly, and by means of the inner ring, with smaller jets, the heat may be kept up to a given temperature after turning off the outer one. Each ring has its own air-chamber and gas-cock. The barrel of the ring is to be of oval section so as to obtain area in depth instead of in width.

The invention with reference to heating apparatus consists in the use of a loose metal cover over that of glazed earthenware or china (described in Patent, No. 3124, 1868). The space between the inner and outer cylinder is filled with loose non-conducting material, such as "adamas," clinkers, and charcoal, in order to isolate the heat and absorb or carry off products of combustion of gas. The heat is thereby prevented from ascending too rapidly, and is to a great extent forced to escape through the open space at the bottom of the apparatus; the outer cover, being also supported by a metal frame, will serve as a guard for the inner apparatus. The outer cover may be made ornamental.

The invention with reference to lighting apparatus consists in the insertion, in the bottom of the tube of gas-burners, of a plug of "adamas" or other suitable bad conducting material, of a square or other suitable angular section, so as when inserted therein to leave spaces for the passage of gas between the inside of the tube and the outside of the plug. The object of this arrangement is to retard combustion, increase light, and regulate the pressure and consumption of gas.

464.—Laurent Luçon and Zoé Peigne Widow Kern, of Nantes, and of 37, Boulevard Bonne-Nouvelle, Paris, in the empire of France, for "*An improved horizontal pump.*" Patent dated Feb. 17, 1870.

The distinctive characteristics of these improved horizontal pumps are:—First, that it has but one piston and one very short pump-barrel; second, the double suction and double forcing by a single piston, each stroke of which sucks and forces at the same time; third, the application of the treadles, whereby great power may be exerted with little fatigue, inasmuch that it is only necessary to stand alternately first on one foot and then on the other to move the piston, by means of the T-piece, of which each treadle uplifts one end, causing its lower branch to move the piston from right to left and from left to right alternately.

480.—Clement Heaton, of Garrick Street, Covent Garden, in the co. of Middlesex, glass painter, for "*Improvements in the means of preventing the bursting of water-pipes by the action of frost.*" Provisional protection only obtained. Dated Feb. 18, 1870.

These improvements consist in the application of suitable air-chambers in communication with the interior water-pipes, for the purpose of allowing adequate space for the increased bulk of frozen water, such air-chambers being fixed by preference to the highest part of the pipes.

485.—Isham Baggs, of High Holborn, in the co. of Middlesex, for "*Improvements in the manufacture of the carbonates of ammonia.*" Provisional protection only obtained. Dated Feb. 18, 1870.

This invention consists in the first place in using the carbonates and bicarbonates of the fixed alkalies either singly or in a state of mixture in place of chalk or carbonate of lime for effecting the decomposition of the salts of ammonia by the aid of heat, and so producing the carbonates of ammonia. For example, in order to produce the sesquicarbonate of ammonia, a full equivalent of the sulphate or muriate of ammonia is mixed with half an equivalent of carbonate of soda and another half equivalent of bicarbonate of soda. The mixture thus formed furnishes exactly the quantity of carbonic acid required for the production of a full equivalent of sesquicarbonate of ammonia. The last-mentioned salt at once comes over in large quantities on the application of a gentle heat, and is condensed in the usual way, whilst sulphate of soda remains in the retort.

A second part of this invention consists in blowing carbonic acid gas by suitable and well-known means through the sulphate or phosphate of ammonia, so as to produce carbonate of ammonia without the necessity of the addition of the carbonated fixed alkalies. The carbonic acid gas for these operations may be obtained by any suitable means.

APPLICATIONS FOR LETTERS PATENT.

35.—John Lupton Bolding and John Thomas Bolding, both of 19, South Molton Street, Oxford Street, and Joseph Titsink, of 28A, York Street, Baker Street, both in the co. of Middlesex, for "*Improvements in water-closets, and in valves and regulating apparatus for the same, and for other purposes.*" Jan. 6, 1871.

53.—Thomas Goode Messenger, of Loughborough, in the co. of Leicester, hydraulic engineer, valve manufacturer, and horticultural builder, for "*Improvements in the coupling of pipes.*" Jan. 10, 1871.

GRANTS OF PROVISIONAL PROTECTION.

3323.—John Reid, of Leith, in the co. of Mid Lothian, N.B., engineer and manager of the Edinburgh and Leith Gaslight Company, for "*An improved liquid-meter.*" Dec. 20, 1870.

3325.—Albert Marcius Silber, of Wood Street, Cheapside, in the City of London, merchant, for "*Improvements in apparatus for lighting and heating purposes.*" Dec. 20, 1870.

3347.—Henry Bonnett, of Swansea, in the co. of Glamorgan, plumber, for "*Improvements in water-closets.*" Dec. 21, 1870.

3309.—Christopher Rawson, of 1, St. Swithin's Lane, in the City of London, general manager of the Native Guano Company, and Philip Ovenden, of 17, Lyndhurst Road, in the co. of Surrey, engineer, and James Wylde, of Leamington, in the co. of Warwick, consulting chemist, and William M'Cree, of 2, Russell Road, Leyton, in the co. of Essex, analytical chemist and engineer, and Henry Hill, of Hastings, in the co. of Sussex, analytical chemist, for "*Improvements in deodorizing and purifying sewage, urine, and refuse matters and liquids, and in making manure therefrom, and in apparatus for those purposes.*" Dec. 30, 1870.

NOTICES TO PROCEED.

2350.—Thomas Lacey, of St. Paul's Road, Canonbury, and Stephen Charles Lacey, of Canonbury Park Square, both in the co. of Middlesex, for "*An improved apparatus for stopping the flow of gas through a meter when any determined quantity has been supplied.*" Aug. 26, 1870.

2426.—Cornelius William Morley, of 42, Clifton Road East, St. John's Wood, London, for "*Improvements in gas-burners, and in the construction of the same.*" Sept. 7, 1870.

2865.—Alexander Horace Brandon, of 5, Quai de Paris, Rouen, France, civil engineer, for "*Improvements in the means or apparatus for producing the more complete combustion of gas, paraffin, and other hydrocarbon oils.*" A communication. Oct. 31, 1870.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

3685.—Jacob Goodfellow, "*Improvements in metallic pistons for steam-cylinders, air-cylinders, or pumps.*" Dec. 28, 1867."

61.—James Lee Norton and William Henry Bailey, "*Improvements in apparatus for indicating and recording the fluctuations of the pressures and temperatures of liquids and fluids.*" Jan. 7, 1868.

Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£		£ s. d.	£ s. d.	£
8000	10	Anglo-Romano	10 0 0	10 0 0	11 — 12
5000	20	Bahia (Limited)	20 0 0	3 0 0	13 — 14
1000	20	Do., preference	20 0 0	10 0 0	25 — 26
750	20	Do., do., redeemable	20 0 0	10 0 0	20 — 22
40000	5	Bombay (Limited)	5 0 0	4 10 0	6¼ — 6⅝
10000	5	Do., third issue	4 0 0	4 10 0	5 — 5¼
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbdge., & Holywll.)	20 0 0	10 0 0	30½ — 31½
7500	20	Cagliari (Limited)	20 0 0	7 0 0	
112000	10	*Chartered*	10 0 0	9 0 0	15 — 16
8000	10	Do., A shares	10 0 0	9 0 0	6¼ — 6⅞
10000	10	Do., B shares, 4 per cent. max.	10 0 0	4 0 0	6⅞ — 7¼
25000	10	Do., 5 per cent. preference	10 0 0	5 0 0	11½ — 12
20000	10	Do., 10 per cent. preference	10 0 0	10 0 0	19¼ — 19⅞
17490	25	*Commercial*	25 0 0	10 0 0	42 — 44
20000	20	Continental Union	20 0 0	8 0 0	23½ — 24½
10000	20	Do., new	7 10 0	8 0 0	8½ — 9½
5213	20	Do., preference (France: Strasbg., Cette, Nismes, Montargis, Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	24 — 26
5000	10	*Crystal Palace District*	10 0 0	10 0 0	16 — 17
5000	10	Do., preference	10 0 0	6 0 0	11 — 12
6044	10	Do., new shares	10 0 0	7 0 0	11 — 12
3956	10	Do.	1 0 0	7 0 0	.. — 1½
4000	50	*Equitable*	50 0 0	10 0 0	88 — 90
4000	25	Do., new shares	25 0 0	10 0 0	43 — 45
23406	10	European (Limited)	10 0 0	11 0 0	14 — 15
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	11 0 0	7¼ — 7⅞
5000	10	Hong Kong (Limited)	10 0 0	9 0 0	11 — 12
26000	50	*Imperial*	50 0 0	10 0 0	83 — 85
26000	10	Do., new shares	10 0 0	10 0 0	16 — 16½
26000	12½	Do., new shares	12 10 0	7 0 0	15 — 16
25000	12½	Do., new shares, 1870	2 10 0	7 0 0	4 — 4¼
1300	100	Do., bonds	£100	10 0 0	175 —180
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	9 2 6	61 — 63
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	67 — 69
3000	10	Do.	10 0 0	5 0 0	7½ — 8¼
3000	20	Do.	17 0 0	7 10 0	3 — 4 pm.
7133	50	*London*	50 0 0	10 0 0	83 — 85
5610	25	Do., 1st preference	25 0 0	6 0 0	27 — 29
503	50	Do., 2nd preference	50 0 0	6 0 0	
214	50	Do., 3rd preference	50 0 0	6 0 0	
£18781		Do., 1st preference stock		6 0 0	
£11828		Do., 2nd preference stock		5 0 0	
15000	5	Nictheroy, Brazil (Limited)	5 0 0	4 10 0	3⅞ — 4⅛
6000	5	Malta and Mediterranean (Limited)	5 0 0	7 0 0	4⅛ — 5⅛
20000	5	Do., preference	2 0 0		2 — 2⅛
30000	5	Mauritius (Limited)	5 0 0	10 0 0	7⅛ — 8⅛
30000	5	Oriental (Calcutta)	2 10 0	10 0 0	3⅛ — 4
10000	5	Do., new shares	5 0 0	nil.	2 — 2⅛
14000	10	Ottoman (Limited)	10 0 0	10 0 0	10 — 11
27000	20	Parà (Limited)	20 0 0	10 0 0	34 — 35
3600	100	*Phœnix*	40 0 0	7 10 0	51 — 54
144000	8k.	Do., new	100 0 0	5 0 0	85 — 90
5000	20	Do.	100 0 0	5 0 0	30 — 32
	20	*Ratcliff*	20 0 0	10 0 0	28¼ — 28¾
6959	5	Rio de Janeiro (Limited)	20 0 0	10 0 0	
2000	5	Singapore (Limited)	5 0 0	7 0 0	
1500	32½	Do., preference	5 0 0	7 10 0	
4000	50	Shanghai	32 10 0	12 0 0	
4000	12½	*South Metropolitan*	50 0 0	10 0 0	87 — 89
20000	12½	Do.	12 10 0	10 0 0	21½ — 22½
15000	10	Do., new shares	2 10 0	10 0 0	4½ — 5½
10000	10	*Surrey Consumers*	10 0 0	10 0 0	15¼ — 16¼
9000	4	Do., new	6 0 0	10 0 0	10 — 11
1500	10	United General (Limerick)	4 0 0	5 0 0	2½ — 2⅞
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	10 — 12
1819	10	Do.	10 0 0	7 10 0	
1138	10	Do.	10 0 0	7 10 0	
20000	10	Do.	5 0 0	7 10 0	
10000	10	Western (Limited) A shares	10 0 0	10 0 0	17 — 18
10000	10	Do., B shares	8 0 0	10 0 0	14¼ — 15
10000	10	Do., C shares	8 0 0	10 0 0	14¼ — 15
20000	10	Do., D shares	1 0 0	10 0 0	2½ — 3
16000	5	*West Ham*	5 0 0	8 0 0	7 — 7¼
10000	5	Do., new shares	1 0 0	8 0 0	
551	10	West London Junction (Limited)	10 0 0	6 0 0	
520	10	Do., preference	10 0 0	6 0 0	

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1 in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb.

Retail Prices are 5 to 10 per cent. higher.	London.			Glasgow.			Newcastle and Middlesboro'.			Wales.			Yorkshire, Derbyshire, and Staffordshire.		
	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
Pig Iron, No. 1 (g.m.b.)	3	15	0	3	12	3	3	10	6	3	10	0	3	15	0
1¼ and 2-inch Socket-pipes	7	0	0	5	18	0	5	10	0	6	0	0	7	0	0
2½ and 3-inch ditto	6	10	0	5	5	0	5	0	0	5	15	0	6	10	0
4 and 5-inch ditto	6	0	0	4	15	0	4	10	0	5	5	0	6	0	0
6 inches and upwards ditto	5	15	0	4	5	0	4	0	0	5	0	0	5	15	0
Retorts, 1st fusion, hot blast	5	10	0	4	10	0	4	5	0	5	0	0	5	10	0
Ditto, 2nd ditto, cold ditto	6	10	0		—			—			—		6	10	0
Tank-plates, ¼ thick and above	6	0	0	5	0	0	4	15	0	5	10	0	6	0	0

WROUGHT-IRON TUBING,

Subject to 60 per cent. Discount.

	2 in.		1½ in.		1¼ in.		1 in.		¾ in.		½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Patent Welded Tubes, from 2 to 14 feet—per foot	1	8	1	1	0	10	0	7	0	5	0	4½
Ditto ditto, from 12 in. to 22½ in.—each	3	0	2	0	1	6	1	1	0	9	0	8
Long Screws, from 12 in. upwards	4	0	2	3	2	0	1	6	1	2	0	11
Bends and Springs	4	2	2	3	1	9	1	3	0	11	0	8
Square Elbows, equal or reducing; Round Elbows, 5 per cent. extra	3	9	2	3	1	9	1	3	0	10	0	8
Tees, wrought or cast	4	0	2	6	2	0	1	6	1	1	0	9
Crosses, ditto, equal or reducing	4	9	3	6	3	0	2	3	1	9	1	6
Iron Cocks	20	9	13	0	10	0	7	3	5	0	3	8
Ditto, with brass plug	28	0	16	0	13	0	7	0	5	6	4	6
Diminishing Sockets, Caps, Plugs, and Nipples	1	3	0	9	0	8	0	6	0	5	0	4½
Plain Sockets	1	0	0	8	0	7	0	5	0	4	0	3
Syphons, 2-quart	15	0	14	0	13	6	13	0	12	0		—

FREIGHTS.

Coastwise—Newcastle:—	Per Ton.	*Foreign:*—	Per Keel.
Chatham and Rochester	6s. 6d	Barcelona	£16 0s
Cork		Bordeaux	12 0
Dover, Folkestone, and Ramsgate	7 3	Boulogne and Calais	8 10
Dublin	8 9	Cadiz	11 10
Exeter Quay	8 6	Cronstadt	—
Ipswich	6 6	Copenhagen	—
London (from Leith)	9 6	Genoa	17 15
London (Pool)	6 3	Hamburg	—
Lowestoft and Yarmouth	5 6	Havre de Grace	10 0
Portsmouth & Southampton	7 9	Leghorn	17 15
Plymouth	8 10	Lisbon	9 0
Shoreham	7 6	Rotterdam	—
Whitstable	7 0	Stettin	—
Weymouth	8 0	Trieste	18 10
		Venice	20 10

GAS COALS.

Newcastle—Unscreened:—	Per Ton.
Haswells, Nettlesworth Primrose, and South Pelaw	6s. 6d.
Felling, Framwell Gate, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	6 9
Burnhope, Craghead, Chariaw, Derwent, East Castle, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, Seaham, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	7 0
Peareth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	7 3
Brancepeth, Dean's Primrose, Londonderry Gas, New Pelton, Pelton, South Peareth, Stella, Urpeth, Washington Hutton, and West Leverson	7 6
Ramsay's Newcastle Cannel	17 6
Wigan Cannel (at Liverpool)	17 0
Welsh Cannel:—	
Coppa Cannel (on rails at Birkenhead), 12s. 6d.; ditto (on rails at Connah's Quay)	13 0

Scotch Cannel, f.o.b.:—	Per Ton.	*Scotch Cannel*, f.o.b.:—	Per Ton.
Boghead—at Bo'ness, 47s. 6d.; at Leith	48s. 2d	Arniston (at Leith)	21s. 0d
Muirkirk	27 0	Wemyss (at Wemyss)	20 0
Kirkness, best (at Burntisland)	22 6	Haywood Co.'s Haywood (at Granton)	20 0
Capeldrae, 1st quality (at ditto)	22 6	Pirnie, or Methill	17 0
Ditto, 2nd ditto (at ditto)	17 6	Lothian's Cannel (at Leith)	24 6
Cowdenbeath (at ditto)	12 0	Grange ditto (at Bridgeness)	17 6
Lochgelly (at ditto)	12 0	Kinniel ditto (at Bo'ness)	17 6
Donnibristle—at Burntisland, 12s.; at Aberdour	12 6	Myles' ditto	23 6
Auchinheath Lesmahago (at Granton)	27 0	Lochore Parrot (at Burntisland)	22 6
Duke of Hamilton's Lesmahago (at Granton)	27 0	Lanemark (at Glasgow)	16 0
		Elphinstone Tower (at Leith)	20 0

SUNDRIES.

Best Newcastle Fire-bricks, per 1000	£2 10s. to £2 15s. 0d.
Cliff's Fire-bricks (at Wortley), per 1000	2 15 0
Ingham's ditto (at Wortley), per 1000	2 15 0
Farnley Iron Co.'s Fire-bricks (at Wortley), less discount	2 17 0
Fire-clay Retorts, per foot run	5s. 6d. to 0 7 6
Tarred Rope Yarn, per cwt.	1 0 0

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(SESSION 1870)

ON THE

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WANTED, at or before Lady-day next, an engagement as Manager, or Secretary and Manager of a Gas-Work, where the annual production is about 50 million cubic feet. The Advertiser is at present engaged as Assistant Manager to a Gas Company in a large provincial town.
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WANTED, at a small Gas-Work, a Man who understands gas-making and fittings, service laying and everything connected with a small Gas-Work. He will have the assistance of a stoker in winter. None but steady men need apply, stating wages.
Address S. L., Post-Office, Sandbach, CHESHIRE.

TO GAS-FITTERS.

WANTED, for a large Institution, a thoroughly competent GAS-FITTER, used to house services generally.
Address, stating age and wages required, to G. H., care of Mr. BOX, BRENTFORD, W.

WANTED, by a Man aged 40, Employ-MENT in a Gas-Work. Has had 15 years experience as a stoker, laying mains and services, fixing meters, &c.
Address WILLIAM ALTHORP, Gas Street, KETTERING.

WANTED, an appointment, as Working MANAGER of a Gas-Work. Thoroughly understands the manufacture of gas and arrangements of the works, mains, services, fixing meters, &c. Unexceptionable references.
Address A. B., 123, Lillington Street, LONDON, S.W.

WANTED, by a middle-aged Man, a situation as MANAGER of a Gas-Work, where a stoker is kept preferred. One who understands the whole duties of a Manager; also laying mains and services. Can have good recommendation.
Address A. PATCH, Church Hill, Carshalton, SURREY.

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WANTED to Purchase, next summer, a set of good second-hand DRY LIME PURIFIERS, three or four in number, about 8 ft. square.
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FOR SALE, a Station-Meter to pass 15,000 cubic ft. per hour, in a handsome square case; made in 1854.
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Apply to Mr. MALAM, Gas-Works, Northallerton, YORKS.

THE Shrewsbury Gas Company are desirous of disposing of an elegant 16-light CHANDELIER, with Argand burners and glasses complete.
The design is one of Messrs. R. W. Winfields and Co. Birmingham. Original cost £75.
Parties desiring to make an offer may inspect the Chandelier at the Gas Offices, on or before the 31st inst.
S. B. DARWIN, Secretary.

TAR.

TENDERS will be received by the Llandudno Water and Gas Company, North Wales, for all the TAR produced at their Gas-Works.
Tenders to be addressed to the MANAGER, Gas-Works, Llandudno, NORTH WALES.

TAR.

THE Directors of the Cambridge Uni-versity and Town Gaslight Company are open to receive OFFERS for their produce of TAR, particulars of which may be had from W. WOOD, Manager.

CONTRACT FOR TAR.

THE Directors of the Phœnix Gas Com-pany are prepared to receive TENDERS for the TAR made at their works, either in respect to all or any of their stations. (The quantity is about 11,000 butts per annum—viz., Vauxhall, 6000; Bankside, 2500; and Greenwich, 2500.) It must be removed by barges, as directed by the Company's officers. Cash monthly.
The contract to be for a period not exceeding five years. Tenders stating the stations or station, the term, and accompanied by the names of two responsible bondsmen, to be sent in on or before the 1st of February ensuing, at Twelve o'clock.
The Directors do not bind themselves to accept the lowest or any tender.
I. A. CROOKENDEN, Secretary.
70, Bankside, S.E, Jan. 6, 1871.

TO GAS APPARATUS CONTRACTORS.

THE Edinburgh and Leith Gas Company are prepared to receive OFFERS up till the 31st of January, for the erection at their works of a quartet set of large DRY LIME PURIFIERS, with connexions and elevated platform for the same, agreably to plans and specifications, which can be examined at the Office here on application to JOHN REID, Engineer and Manager.
Edinburgh and Leith Gas Company's Office,
11, Baltic Street, Leith, Dec. 31, 1870.

GAS-TANKS AND GASHOLDERS FOR SALE.

THE Edinburgh and Leith Gaslight Company have FOUR CAST-IRON TANKS, with Gasholders, for disposal. Two larger cast-iron Tanks, 51½ ft. diameter, and 26 ft. deep, and two smaller, 41½ ft. diameter, and 20 ft. deep; each size with Gasholders in constant daily operation. The capacity of each of the two large Gasholders is 50,000, and the smaller size 25,000 cubic feet.
These are worthy the attention of Gas Companies, Paraffin Oil and Coal Tar Manufacturers, and can be inspected by application to the Subscriber, by whom proposals to purchase will be received till Jan. 31, 1871.
JOHN REID, Engineer and Manager.
Edinburgh and Leith Gas-Works,
11, Baltic Street, Leith, Dec. 17, 1870.

TO GAS-METER MAKERS.

THE Directors of the Gaslight and Coke COMPANY are prepared to receive TENDERS for repairing their WET and DRY METERS, in accordance with a specification to be obtained at this Office on application to the undersigned, to whom sealed tenders, marked "Tender for Repairing Meters," should be sent on or before Thursday the 26th inst. By order,
JOHN ORWELL PHILLIPS, Secretary.
Horseferry Road, Westminster,
Jan. 11, 1871.
N.B.—The Directors do not bind themselves to accept the lowest or any tender, and reserve to themselves the right of accepting the whole or any portion of one tender.

GLASGOW CORPORATION GAS.

CONTRACT FOR GASHOLDERS AND FRAMINGS.

THE Committee of the Town Council on Gas Supply are prepared to receive TENDERS for the construction of Two TELESCOPE GASHOLDERS, each 160 ft. by 60 ft., at Dalmarnock Gas-Works.
The Committee are also prepared to receive TENDERS for providing and erecting COLUMNS AND GIRDERS, forming framing of above Gasholders.
Plans and specifications may be seen, and forms of tender obtained, at the Engineer's Office, 42, Virginia Street.
Sealed tenders, marked "Tender for Gasholders" or "Tender for Framing," as the case may be, to be lodged with the Engineer not later than the 30th inst.
42, Virginia Street, Glasgow,
Jan. 13, 1871.

PARISH OF BIRMINGHAM.

TO GAS ENGINEERS AND OTHERS.

THE Guardians of the Poor of this Parish are desirous of receiving plans, specifications, and estimates for the erection of WORKS (including all appurtenances) for supplying Gas to the Workhouse and Boys School in connexion therewith, situate at Birmingham Heath. The consumption in winter is nearly 200,000 feet per week. The plans, specifications, and estimates must be prepared, and sent to me at these Offices, not later than Monday, Jan. 30, 1871, at the sole cost of the person estimating, and the wrapper must be endorsed "Gas Plan."
The site of the intended works, and any other information on the subject, may be obtained upon application to Mr. Sharp, the Master of the Workhouse.—By order,
WILLIAM THOMPSON, Clerk to the Guardians.
Parish Office, Paradise Street,
Birmingham, Dec. 30, 1870.

EDGE'S PATENT
FOR REMOVING THE
CARBONACEOUS INCRUSTATION FROM GAS-RETORTS.

"21, *Parliament Street, Westminster, S.W., Nov.* 5, 1870.

"Dear Sir,—I had occasion to visit a country gas-work, which at the present time is being remodelled under my direction, and found the only available Retorts in such a state as the word 'desperate' only feebly describes, carbon having been deposited in many of them to the extent of about 5 ft. in length, in solid blocks of 15 in. diameter. The works under these circumstances being only able to produce about half the gas required for the town. I need not explain how such a state of things had come to pass; it is enough to say I had to deal with it. I applied Edge's patent process, which I have to thank you for bringing under my notice a few months since, and you will be glad to hear that perfect and complete success resulted from its application.
"I believe I am acquainted with all the known methods of dealing with this question of the removal of carbon from the interior of Retorts, but I am quite satisfied that no other than this would have enabled me to save the town in question from darkness. I feel that it is due to you and the patentee to call the attention of gas managers to the invention, which I regard as a boon beyond all praise.
"The Clay Retorts upon which I operated were nearly worn out, and, but for this method of dealing with them, would have been rendered totally useless, whereas they are now doing good service, and working off full charges at good heats.—I am, dear sir, yours faithfully,
"E. Goddard, Esq." "R. P. SPICE.

For particulars and terms, apply to E. GODDARD, Sole Agent, Gas-Works, IPSWICH.

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ALFRED LASS,
ACCOUNTANT.
28, NORTH STREET, WANDSWORTH, S.W.

Mr. Alfred Lass having had considerable experience in arranging, making up, balancing and auditing gas accounts, begs to inform the Directors of Gas Companies that he may be consulted on all matters relating thereto.

Balance-sheets prepared, Accounts audited, Consultations, Agencies, &c.

BOOKS FOR GAS ACCOUNTS.

ALFRED DOUBBLE & Co., 2, Serjeants Inn, and 40, Fleet Street, London, make and supply all the various ACCOUNT-BOOKS as approved and adopted by Accountants, &c., to Gas Companies.

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EDWD. SANDELL, Public Accountant and Auditor, 4, Skinner's Place, Size Lane, London.

The projector of the *Gas Companies Analyzed Expenditure Account-Book* offers his experience and services in the examination, preparation, and production of all accounts in reference to Gas Companies. References if required.

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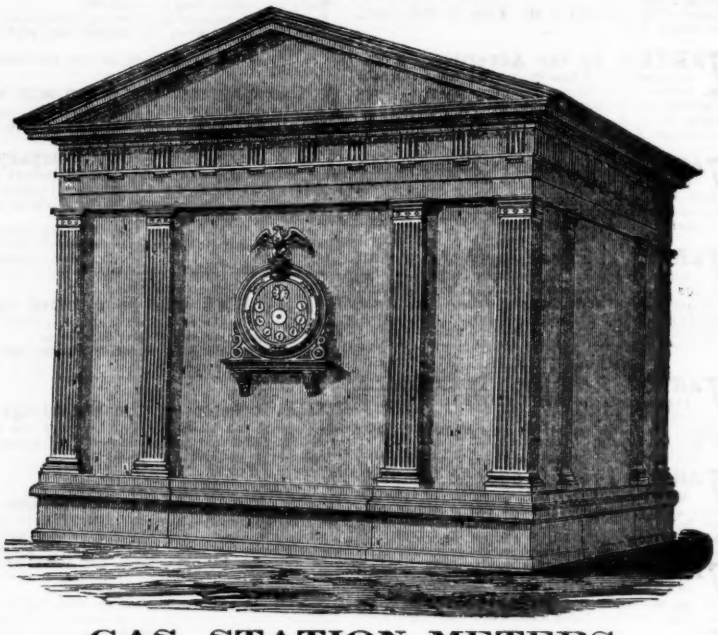

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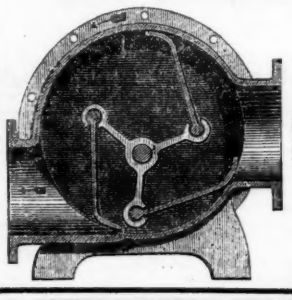

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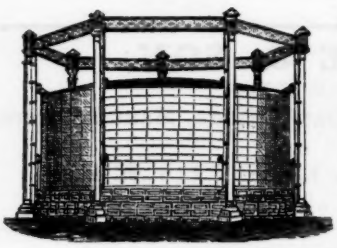

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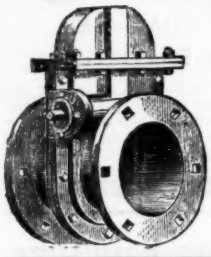

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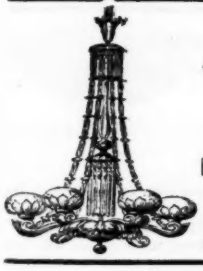

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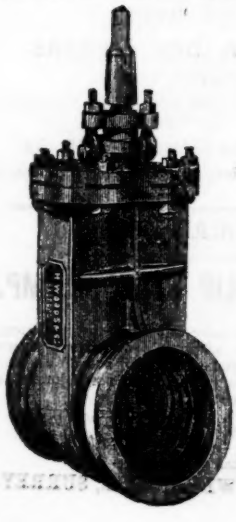

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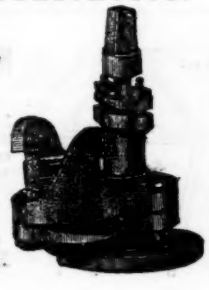

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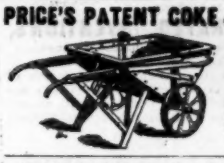

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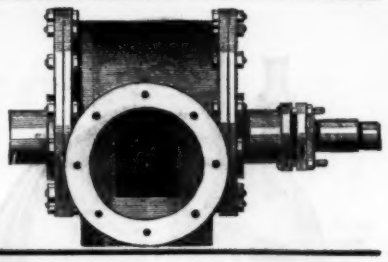

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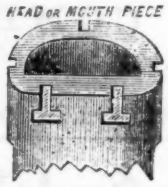

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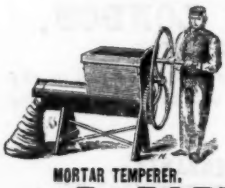

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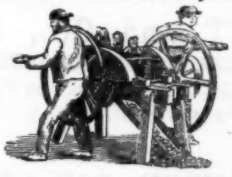

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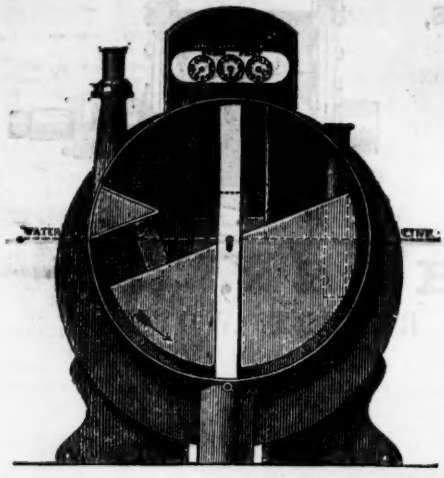

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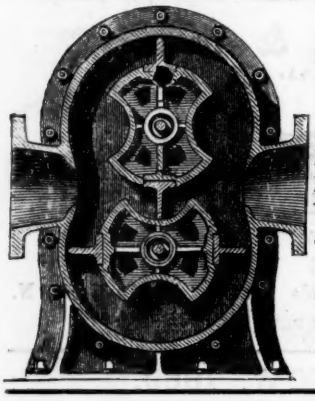

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